FURUNO

OPERATOR'S MANUAL

COLOR GPS/PLOTTER/SOUNDER

MODEL **GP-7000F**

FURUNO ELECTRIC CO., LTD.

www.furuno.co.jp

(Elemental Chlorine Free)

The paper used in this manual
is elemental chlorine free.

FURUNO ELECTRIC CO., LTD.

9-52 Ashihara-cho,
Nishinomiya, 662-8580, JAPAN

Telephone : +81-(0)798-65-2111
Fax : +81-(0)798-65-4200

• FURUNO Authorized Distributor/Dealer

 Printed in Japan

A : AUG. 2004
C3 : JUN. 05, 2008

Pub. No. OME-44291-C3

(HIMA) GP-7000F

00014913712

IMPORTANT NOTICES

- This manual is intended for use by native speakers of English.
- No part of this manual may be copied or reproduced without written permission.
- If this manual is lost or worn, contact your dealer about replacement.
- The contents of this manual and equipment specifications are subject to change without notice.
- The example screens (or illustrations) shown in this manual may not match the screens you see on your display. The screen you see depends on your system configuration and equipment settings.
- Store this manual in a convenient place for future reference.
- FURUNO will assume no responsibility for the damage caused by improper use or modification of the equipment (including software) by an unauthorized agent or a third party.
- When it is time to discard this product it must be done according to local regulations for disposal of industrial waste. For disposal in the USA, refer to the Electronics Industries Alliance (http://www.eiae.org/).

⚠ SAFETY INSTRUCTIONS

⚠ WARNING

Do not open the equipment.

Hazardous voltage which can cause electrical shock, burn or serious injury exists inside the equipment. Only qualified personnel should work inside the equipment.

Do not disassemble or modify the equipment.

Fire, electrical shock or serious injury can result.

Immediately turn off the power at the switchboard if the equipment is emitting smoke or fire.

Continued use of the equipment can cause electrical shock.

Do not operate the equipment with wet hands.

Electrical shock can result.

Use the proper fuse.

Fuse rating is shown on the power cable. Use of a wrong fuse can result in damage to the equipment.

Do not maneuver the vessel based on the depth indication alone.

Grounding may result.

About the TFT LCD

The TFT LCD is constructed using the latest LCD techniques, and displays 99.99% of its pixels. The remaining 0.01% of the pixels may drop out or blink, however this is not an indication of malfunction.

⚠ CAUTION

Do not use the equipment for other than its intended purpose.

No one navigation device should ever be solely replied upon for the navigation of a vessel.

Always confirm position against all available aids to navigation, for safety of vessel and crew.

Do not turn on the equipment with the transducer out of water.

The transducer may be damaged.

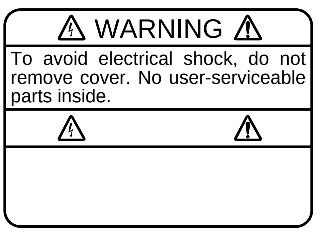
Use the proper gain setting.

Incorrect gain may produce wrong depth indication, possibly result ing in a dangerous situation. See "Adjusting the gain" on page 10-11.

The picture is not refreshed when picture advancement is stopped.

Maneuvering the vessel in this condition may result in a dangerous situation.

A warning label is attached to the equipment. Do not remove the label. If the label is missing or illegible, contact a FURUNO agent or dealer.



Name: Warning Label (1)
Type: 86-003-1011-1
Code No.: 100-236-231

FOREWORD

Congratulations on your choice of the FURUNO GP-7000F COLOR GPS/PLOTTER/SOUNDER. We are confident you will see why the FURUNO name has become synonymous with quality and reliability.

For 60 years FURUNO Electric Company has enjoyed an enviable reputation for innovative and dependable marine electronics equipment. This dedication to excellence is furthered by our extensive global network of agents and dealers.

This equipment is designed and constructed to meet the rigorous demands of the marine environment. However, no machine can perform its intended function unless installed, operated and maintained properly. Please carefully read and follow the recommended procedures for operation and maintenance.

Features

The GP-7000F provides a totally integrated GPS receiver, color video plotter and color video sounder.

The GPS receiver tracks up to 13 satellites (GPS: 12, WAAS: 1) simultaneously, and an 8-state Kalman filter ensures optimum accuracy in determination of vessel position, course and speed.

- C-MAP NT + and MAX chart card (SD) is available.
- Comprehensive navigation data displays.
- Bright 7-inch color TFT LCD with brilliance control.
- Automatic coastline chart loading.
- Position display in latitude and longitude, Loran C TD.
- Alarms: Arrival, Anchor Watch, Cross-track Error, Speed, Grounding, Fish, Depth, Temperature.
- Man overboard feature records latitude and longitude coordinates at the time of man overboard.
- "Highway" display provides graphic presentation of ship's track and is useful for monitoring cross track error.
- Automatic or manual video sounder operation.

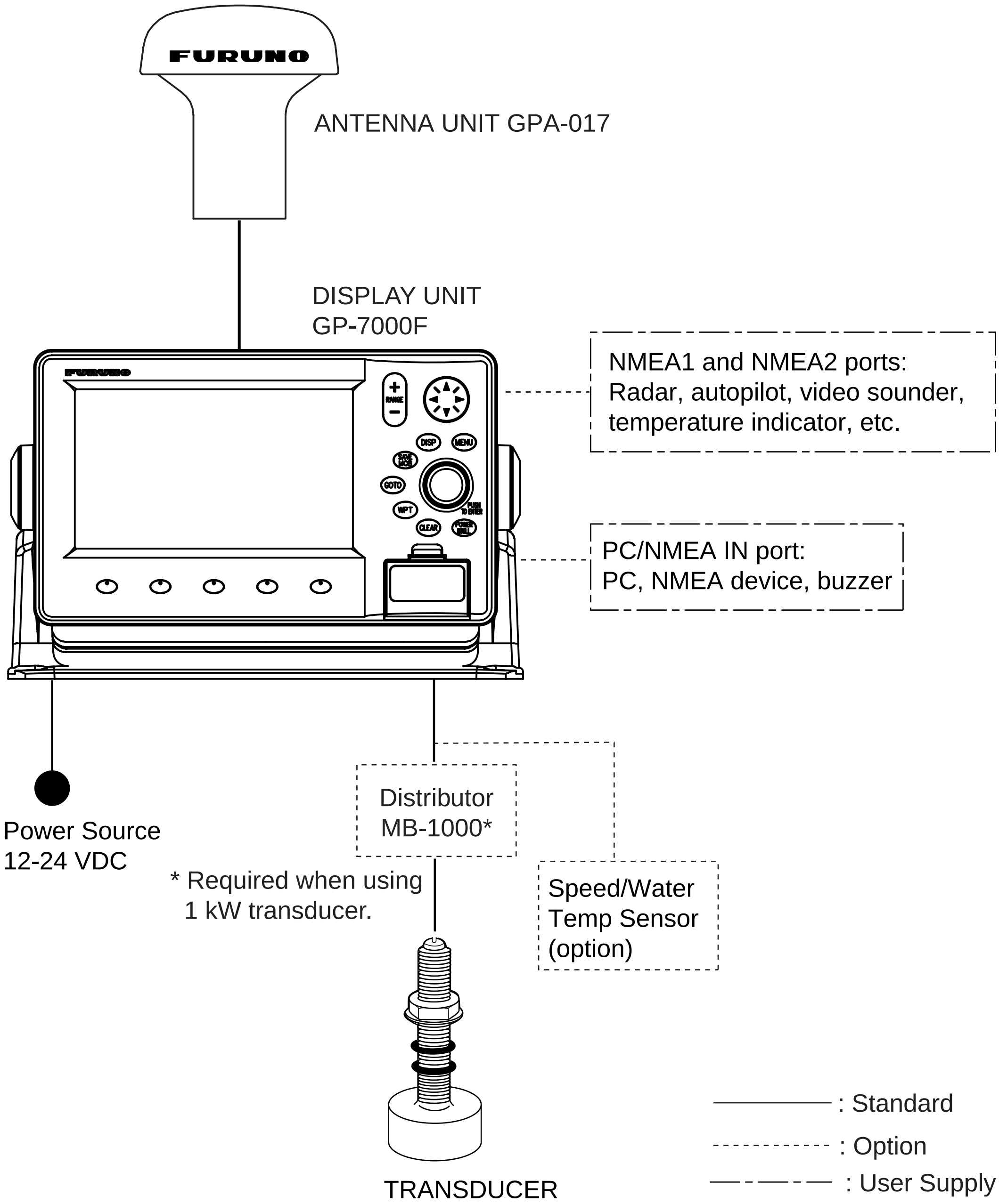
TABLE OF CONTENTS

Notice for SD™Card

We confirmed that the following brands of SD™ cards can be used for uploading/downloading data. For SD™ cards other than listed below, we have not yet confirmed if they are compatible with GP-7000/F.

- Kingstone
- Viking
- EP Memory
- SANDISK
- Panasonic
- Toshiba
- PQI
- Power Quotient
- ADTEC
- buffalo
- I/O DATA
- Hagiwara Sys-com
- LEXAR

SYSTEM CONFIGURATION



How to remove the hard cover
Place your thumbs at the center of the cover, and then lift the cover while pressing it with your thumbs.

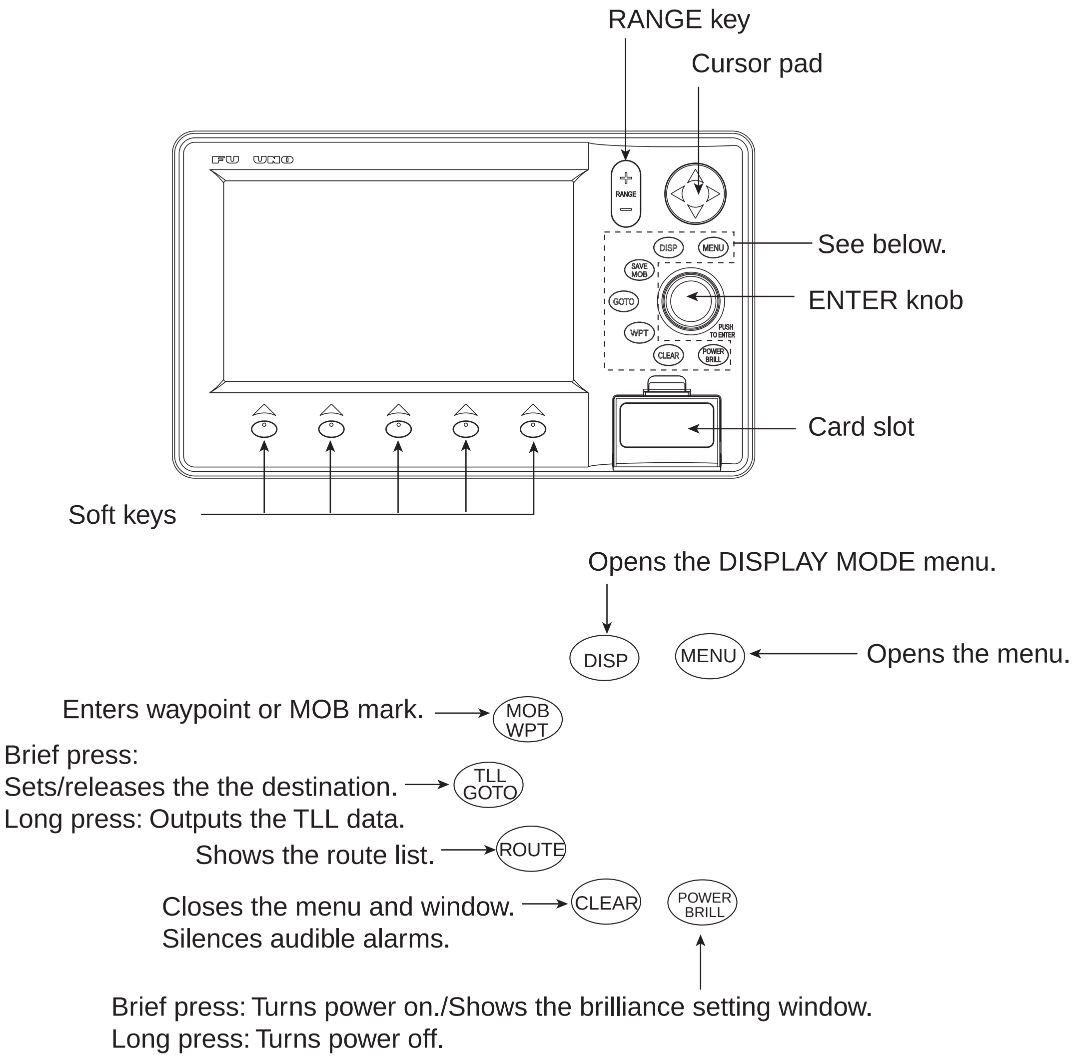


This GPS receiver complies with Canadian standard RSS-210 (Low Power License-Exempt Radio communication Devices). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

1. OPERATIONAL OVERVIEW

This chapter acquaints you with the basics of your unit-from turning on the power to the soft key menu operation.

1.1 Display Unit Controls



Display unit, front view

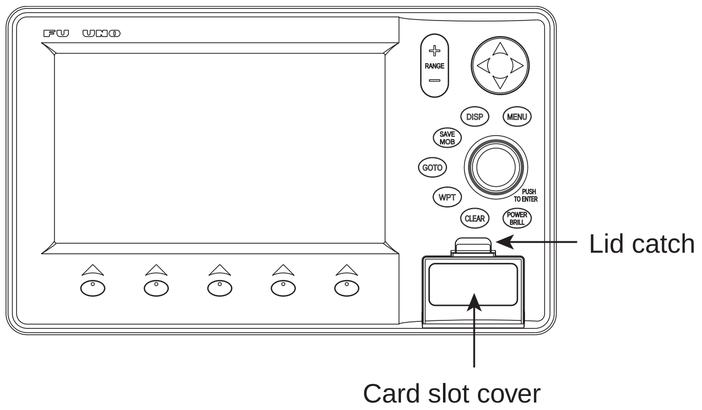
1.2 Loading an SD™ Chart Card

Your unit reads C-MAP NT+ /NT MAX™ charts, stored on SD™ cards. Insert the appropriate chart card for your area before turning the power on to show chart data automatically.

Note 1: Static electricity can be passed through your fingers to a card and destroy the contents of the card. To prevent this, always touch a metallic object, such as a steel desk, before handling an SD™ card.

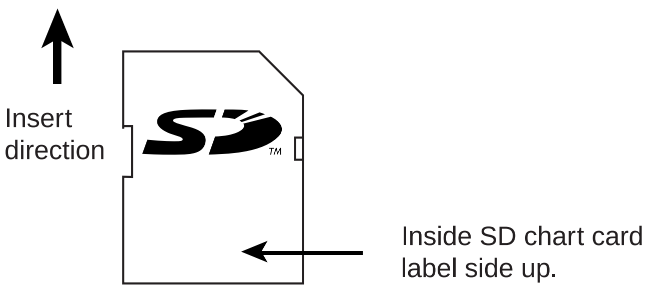
Note 2: Do not insert or remove a card while the power is on. This may cause the equipment to freeze.

1. Push down the lid catch to open the card slot cover.



Card slot cover

2. Insert appropriate SD™ chart card label side up to any slot.



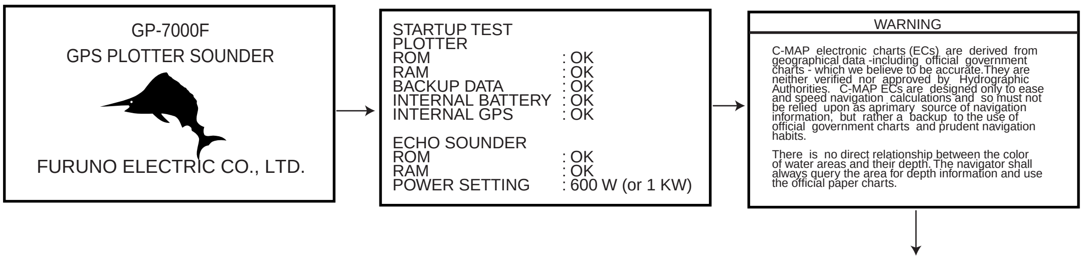
SD™ chart card

3. Press the center of the lid catch to close the card slot cover, to protect the chart drive. (Keep the slot cover closed at all times.)

1.3 Turning the Power On/Off

Turning the power on

Press the [POWER/BRILL] key until you hear a click and a beep. When the unit is turned on, it proceeds in the sequence shown in the figure below.



In about 30 seconds the last-used display appears. You can go to the last-used display faster by pressing any key when this screen appears.

Start-up sequence

Note 1: The example screens shown in this manual may not match the screens you see on your display. The screen you see depends on your system configuration and equipment settings.

Note 2: If the message "SYSTEM HAS FAILED START UP TEST. PLEASE CONTACT A LOCAL FURUNO REPRESENTATIVE FOR REPAIR. PRESS ANY KEY TO CONTINUE." appears, contact your dealer for advice.

Note 3: At the very first time you turn on your unit, the simulation mode window appears. Choose YES or NO as appropriate and push the [ENTER] knob.

The equipment takes 90 seconds to find its position when turned on for the very first time. Thereafter it takes about 12 seconds to find position each time the power is turned on. The message "NO FIX", which means the equipment is now finding its position, appears at the bottom of the plotter display immediately after turning the power on. When the GPS receiver finds its position, "NO FIX" changes to "2D" or "3D" to show that position data is now accurate.

Turning the power off

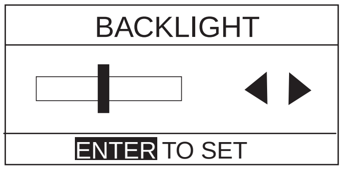
Press and hold the [POWER/BRILL] key until the screen goes blank (about four seconds).

1.4 Adjusting Brilliance and Contrast

You can adjust display brilliance and contrast as shown below.

1. Press the [POWER/BRILL] key momentarily.

   The BACKLIGHT window appears.



Backlight window

2. Rotate the [ENTER] knob to adjust.

   Rotate clockwise to raise the setting or counterclockwise to decrease it.

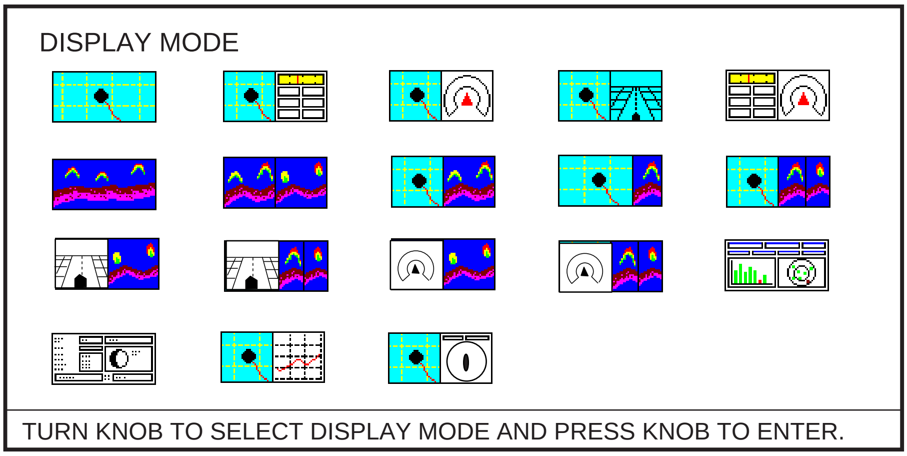
   To escape from this window without adjusting, press the [CLEAR] or [POWER/BRILL] key, or wait three seconds to let the equipment close it automatically.

3. Press the [ENTER] key to close the window.

1.5 Selecting a Display

Fourteen screen displays are available as shown figure in below.

1. Press the [DISP] key to show the DISPLAY MODE screen.



Display mode screen

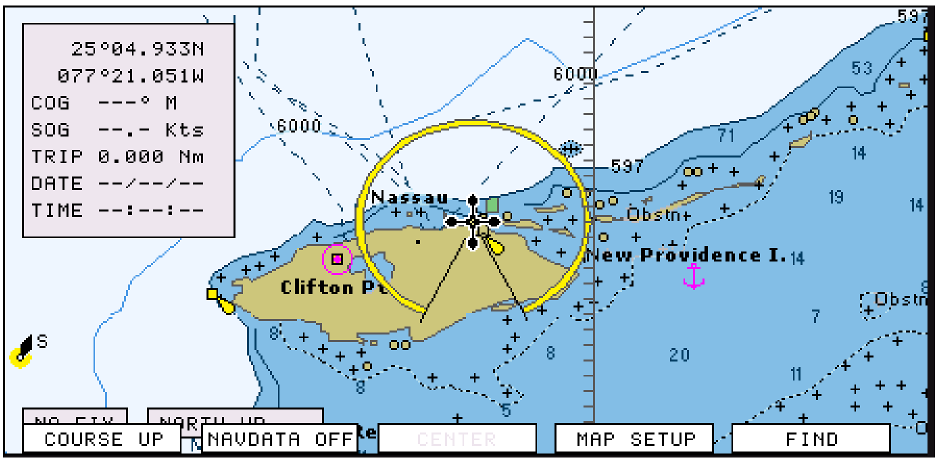
2. Use the cursor pad or [ENTER] knob to select a mode.

   To escape from the display mode screen without changing the display mode, press the [DISP] key.

3. Press the [ENTER] knob to set the new display mode.

1.6 Soft Keys

The soft keys, their labels displayed at the bottom of the screen, provide for easy execution of a desired function, and their label and function change according to the display in use. When you turn on the power, the soft keys do not appear. To show the soft keys, press any soft key. To access a soft key function, press the appropriate soft key within five seconds after accessing them.



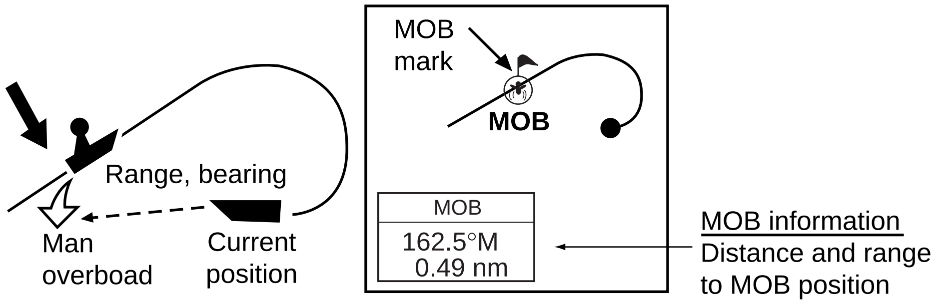
Soft keys

The soft keys disappear after five seconds. If you want to erase them earlier, press the [CLEAR] key.

1.7 MOB Mark

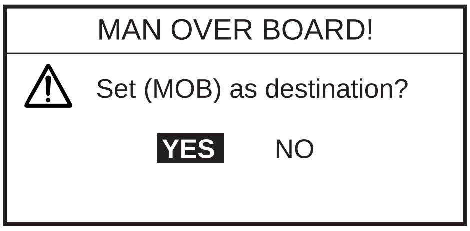
1.7.1 Entering the MOB mark, setting MOB as destination

The MOB (Man Overboard) mark functions to mark man overboard position. You can inscribe this mark from any mode.



MOB concept

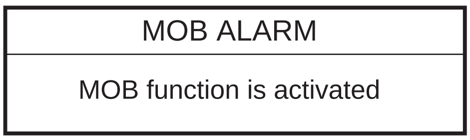
1. Press and hold down the [MOB/WPT] key immediately for about three seconds when someone falls onboard, to show the display below.



MOB message window

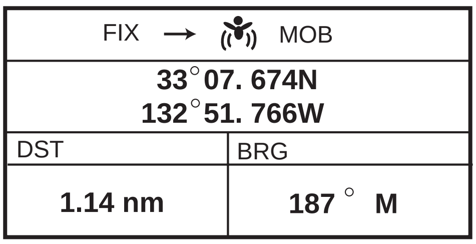
2. Confirm that YES is selected, and then press the [ENTER] knob to set the MOB position as the destination. (Choose NO to mark position as a waypoint.)

   If you select the MOB position as the destination, the MOB ALARM window appears. Push the [ENTER] knob to erase it and then the following message appears on the display.



MOB ALARM window

Distance and bearing to the MOB position are shown in the MOB data box when the cursor is placed on the MOB mark.



MOB data box

1.7.2 Deleting the MOB mark

1. Operate the cursor pad to place the cursor on the MOB mark, and then press the STOP soft key to cancel the navigation to the MOB mark.
2. Press the DELETE soft key to show the confirmation window.
3. Choose "YES", and then press the [ENTER] knob to delete the MOB mark.

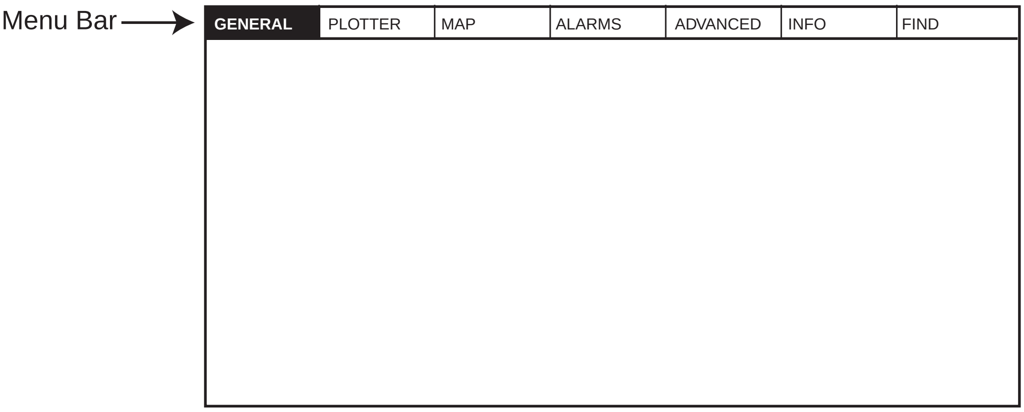
   The color of MOB mark changes to blue. After changing the range, the MOB mark is cleared completely.

1.8 Menu Operation

Most operations are carried out from the menu bar. The menu bar is opened or closed with the [MENU] key. Menus and options may be selected by rotating the [ENTER] knob or operating the cursor pad. However, this manual describes operating procedure using the [ENTER] knob.

<u>Using the [ENTER] knob</u>

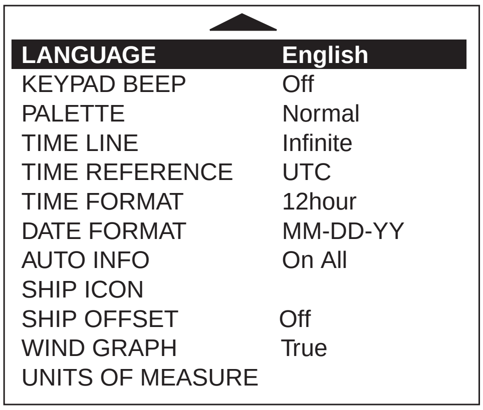
1. Press the [MENU] key to show the menu bar.



Menu bar

2. Rotate the [ENTER] knob to choose a menu title and then push the [ENTER] knob to show the menu.

   For example, choose GENERAL to display the GENERAL menu.



General menu

3. Rotate the [ENTER] knob to choose an item and then push the [ENTER] knob.

   For example, choose LANGUAGE.

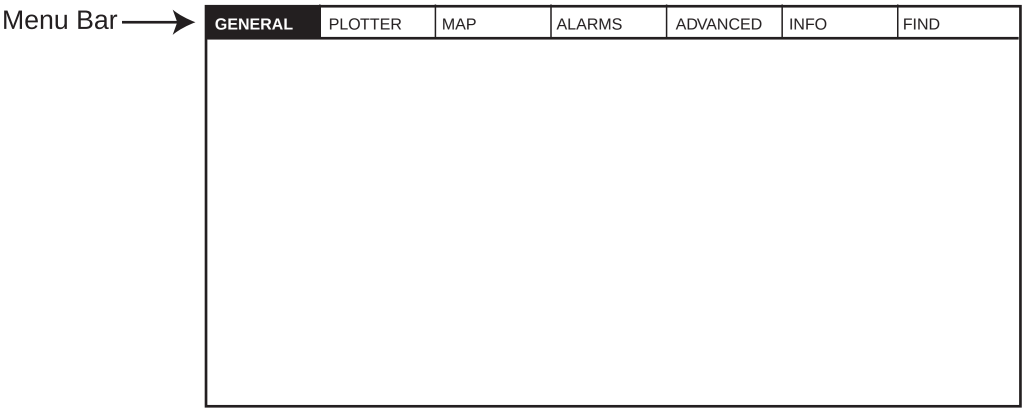
4. Rotate the [ENTER] knob to choose the option desired and then press the [ENTER] knob.

   To cancel, press the [CLEAR] key.
5. To close all menus and option windows, press the [MENU] key.

   To close option windows one by one, press the [CLEAR] key.

Using the cursor pad

1. Press the [MENU] key to show the menu bar.



Menu bar

2. Press ◀ or ▶ on the cursor pad to choose a menu title and then press ▼ to show the corresponding menu.

   For example, choose GENERAL to display the GENERAL menu.

LANGUAGE	**English**
KEYPAD BEEP	Off
PALETTE	Normal
TIME LINE	Infinite
TIME REFERENCE	UTC
TIME FORMAT	12hour
DATE FORMAT	MM-DD-YY
AUTO INFO	On All
SHIP ICON	
SHIP OFFSET	Off
WIND GRAPH	True
UNITS OF MEASURE	

General menu

3. Press ▼ to choose an item and then press ▶ to show its option window.

   For example, choose LANGUAGE.

4. Press ▼ to choose an option and then press ▶ to close the window.

   To cancel, press ◀.
5. To close all menus and option windows, press the [MENU] key.

   To close option windows one by one, press the [CLEAR] key.

1.9 Simulation Mode

The simulation mode, which is for use by service technicians for demonstration purposes, provides simulated operation to help acquaint users with the functions of the unit. All keys are operative.

"SIMUL" appears at the bottom of the display when the simulation mode is active.

Plotter

Own ship's mark moves from the default or selected position at the speed and course set.

1. Press the [MENU] key to display the menu bar.
2. Rotate the [ENTER] knob to choose ADVANCED and then push the [ENTER] knob.
3. Rotate the [ENTER] knob to choose GPS SIMULATION and then push the [ENTER] knob to show the following window.

SIMULATION MODE	Off
COURSE	007° M
SPEED	001.0 Kts
DATE	Apr/02/04
TIME	12:00:00 AM
CURSOR CONTROL	Off

GPS simulation window

4. Rotate the [ENTER] knob to choose SIMULATION MODE and then push the [ENTER] knob.
5. Rotate the [ENTER] knob to choose On and then push the [ENTER] knob.
6. Rotate the [ENTER] knob to choose COURSE and then push the [ENTER] knob.
7. Enter the course (Setting range: 0 to 359) by rotating the [ENTER] knob, pressing the ◀ or ▶, and then press the SAVE soft key.

   Note: You can return the value to zero by pressing the CLR FLD soft key.
8. Enter SPEED, DATE and TIME.
9. Rotate the [ENTER] knob to choose CURSOR CONTROL and then push the [ENTER] knob.
10. Rotate the [ENTER] knob to choose On or Off as appropriate and then push the [ENTER] knob.

    When On is selected, you can set course value (◀ ▶) and speed value (▲ ▼) on the simulation plotter display.

    When you select On, the cursor does not appear on the plotter menu.
11. Rotate the [ENTER] knob to choose SELECT POSITION and then push the [ENTER] knob.

    The plotter display appears.
12. Operate the cursor pad to place the cursor at the desired starting point.

13. Push the [ENTER] knob to move the own ship mark on the cursor.
14. Press the [CLEAR] key.

Echo sounder

1. Press the [MENU] key to show the menu bar on the plotter display.
2. Rotate the [ENTER] knob to choose ADVANCE and then push the [ENTER] knob.
3. Rotate the [ENTER] knob to choose ECHO SOUNDER SIMULATION and then push the [ENTER] knob.
4. Rotate the [ENTER] knob to choose On and then push the [ENTER] knob.
5. Press the [MENU] key to close the menu.
6. Choose the sounder display on the display mode screen.

2. PLOTTER DISPLAYS

2.1 Presentation Modes

The plotter display mainly shows chart, ship's track, waypoints, and navigation data.

Three types of display presentations are provided for the normal plotter display: north-up, course-up and auto course-up. To change the mode, use the presentation mode selection soft key, which is the leftmost soft key.

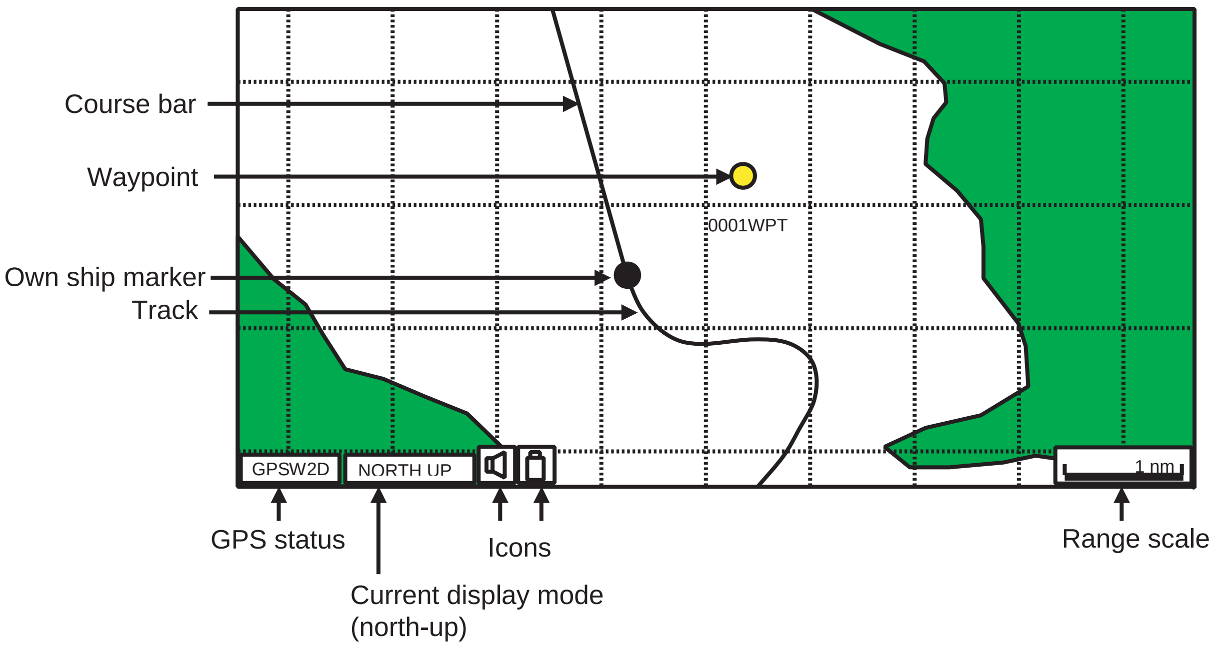
2.1.1 North-up

1. Press any soft key to show the soft key labels.
2. Press the NORTH UP soft key to show the north-up display. North (zero degree) is at the top of the display.

   When the cursor is on, the own ship moves and the chart is fixed. (True motion)

   When the cursor is off, the chart, waypoints and other marks move and own ship is fixed. (Relative motion)

   To turn the cursor off, press the CENTER soft key.

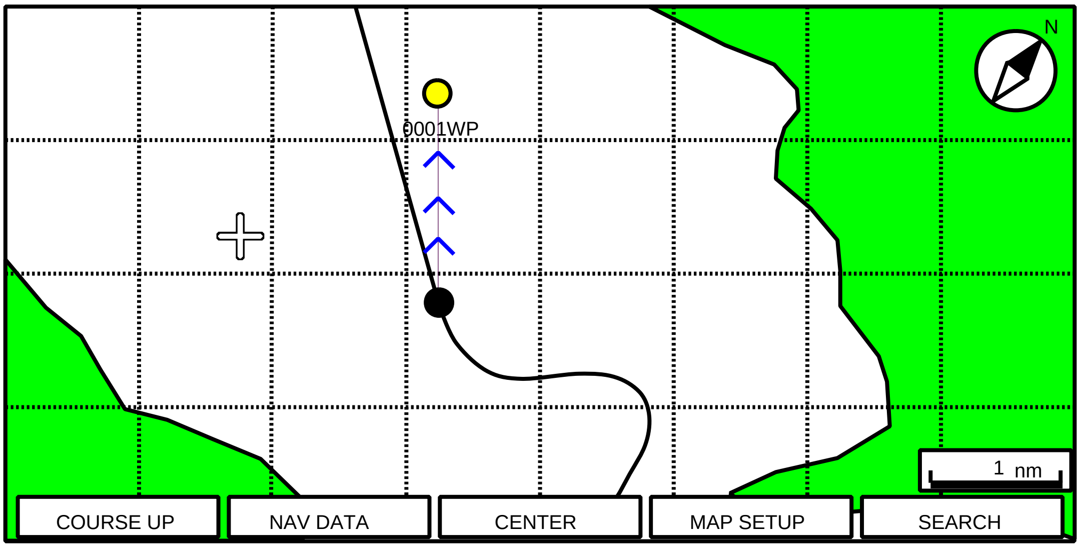


Plotter display, north-up mode

2.1.2 Course-up

Press the COURSE UP soft key to show the course-up display. When destination is set, it is at the top of the screen and the north mark appears at the upper right side of the screen and points to north.

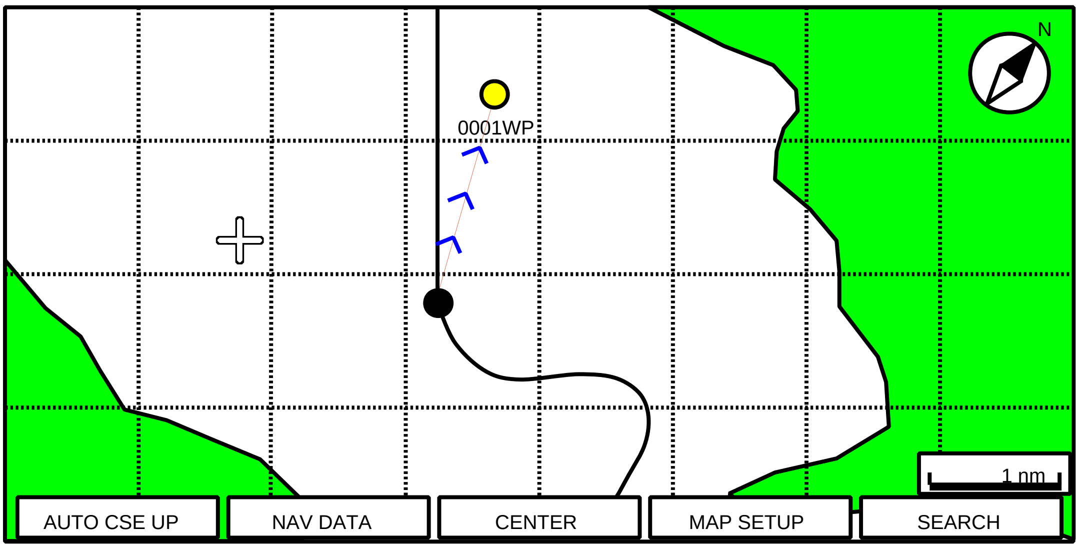
When destination is not set, the course is upward on the screen at the moment the course-up mode is selected.



Plotter display, course-up mode

2.1.3 Auto course-up

Press the AUTO CSE UP soft key to show the automatic course-up display. The course or heading is at the top of screen at the moment the auto course-up mode is selected. When own ship is off its intended course by 30° (default setting, this degree can be changed on NAVIGATION menu. For details, see chapter 8.) or more, it is automatically brought back to perpendicular.



Plotter display, auto course-up mode

2.2 Cursor

2.2.1 Turning on the cursor, shifting the cursor

Press the cursor pad to turn the cursor on, and the cursor appears at the own ship's position. Operate the cursor pad to shift the cursor. The cursor moves in the direction of the arrow or diagonal pressed on the cursor pad.

Cursor state determines what data is shown in the NAVDATA window. This window can be enabled or disabled by pressing the NAVDATA ON soft key.

+	25° 04.933E 077° 21.051W
COG	007° M
SOG	0.10 Kts
DST	12.6 Nm
BRG	28.3° M
TRIP	631 nm

NAVDATA window

Also, when the cursor is placed on own ship's position, its data is shown as follows.

FIX	3D
33°37.125N 118°48.428W	
SOG	COG
1.00 kts	007° M

Own ship's position data window

2.2.2 Moving the cursor to the center of the screen

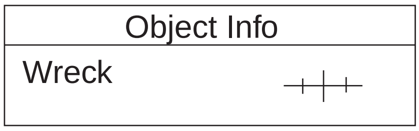
Press the CENTER soft key to return the cursor to the screen center.

2.2.3 Displaying data

Besides its fundamental functions of providing position data, the cursor can also provide data for chosen caution area, depth area, source of data, etc. Further, you can display information about an icon by placing the cursor on it.

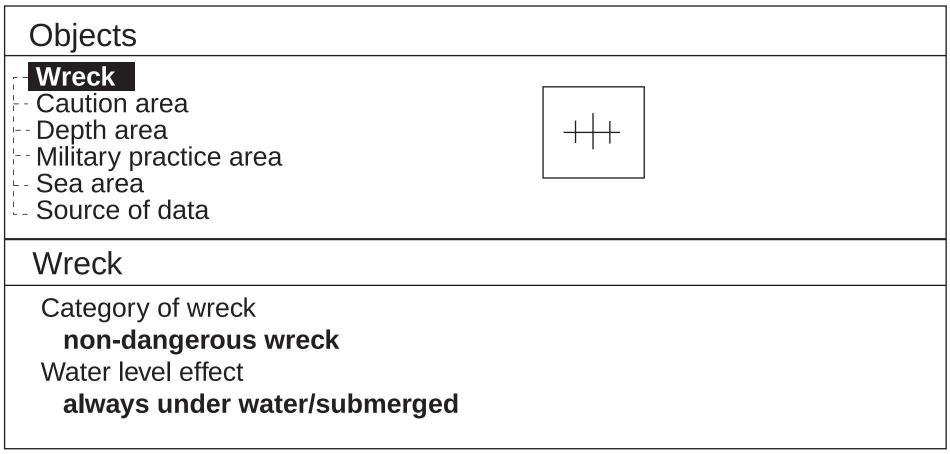
1. Press the cursor pad to turn the cursor on.
2. Use the cursor pad to place the cursor on the position desired.

   The object information window appears.



Object information window (ex. wreck)

3. If you want to know more details, press the Details soft key.



Object detail window (ex. wreck)

4. Rotate the [ENTER] knob to choose the item you want to know more about.

   Detailed information appears in the lower column.
5. Press the [CLEAR] key to close the window.

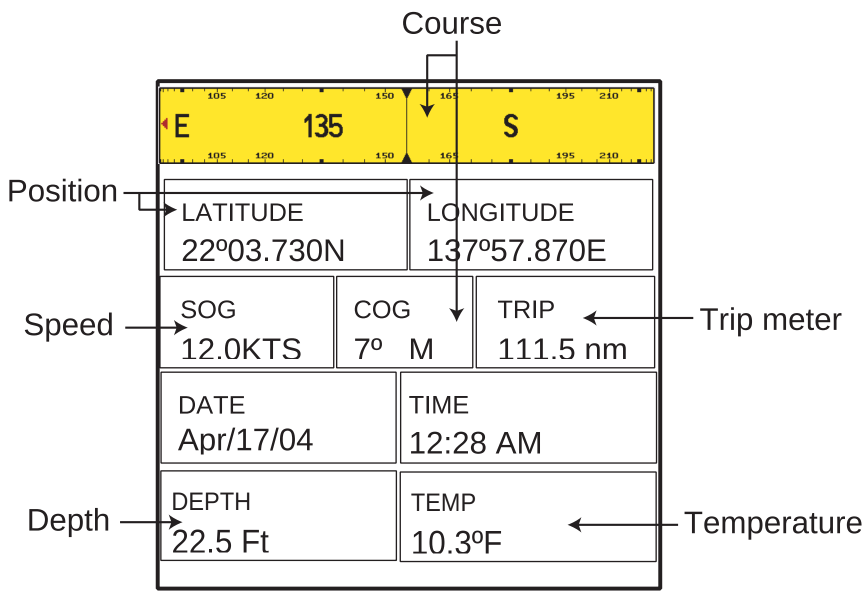
2.3 Selecting Chart Scale/Range

Chart scale (range) may be selected with the [RANGE] key. The [RANGE +] key zooms in the chart; [RANGE -] key zooms out it.

2.4 Navigation Data Display

The navigation data display provides generic navigation data, and it is shown in combination displays.

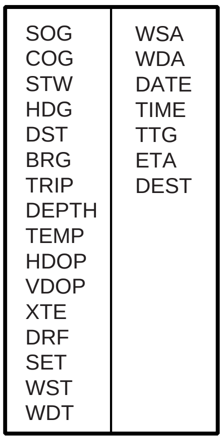
Appropriate sensors are required. Bars (- -) appear when corresponding sensor is not connected.



Navigation data display

Changing the information displayed

1. Press and hold the [MENU] key down for two seconds to show Speed in reverse video.
2. Rotate the [ENTER] knob to show data in reverse video.
3. Press the [ENTER] knob to show the selection window as shown below.



Note: Contents may be changed depending on data selected at step2.

4. Rotate the [ENTER] knob to choose the data to show, and then press it.

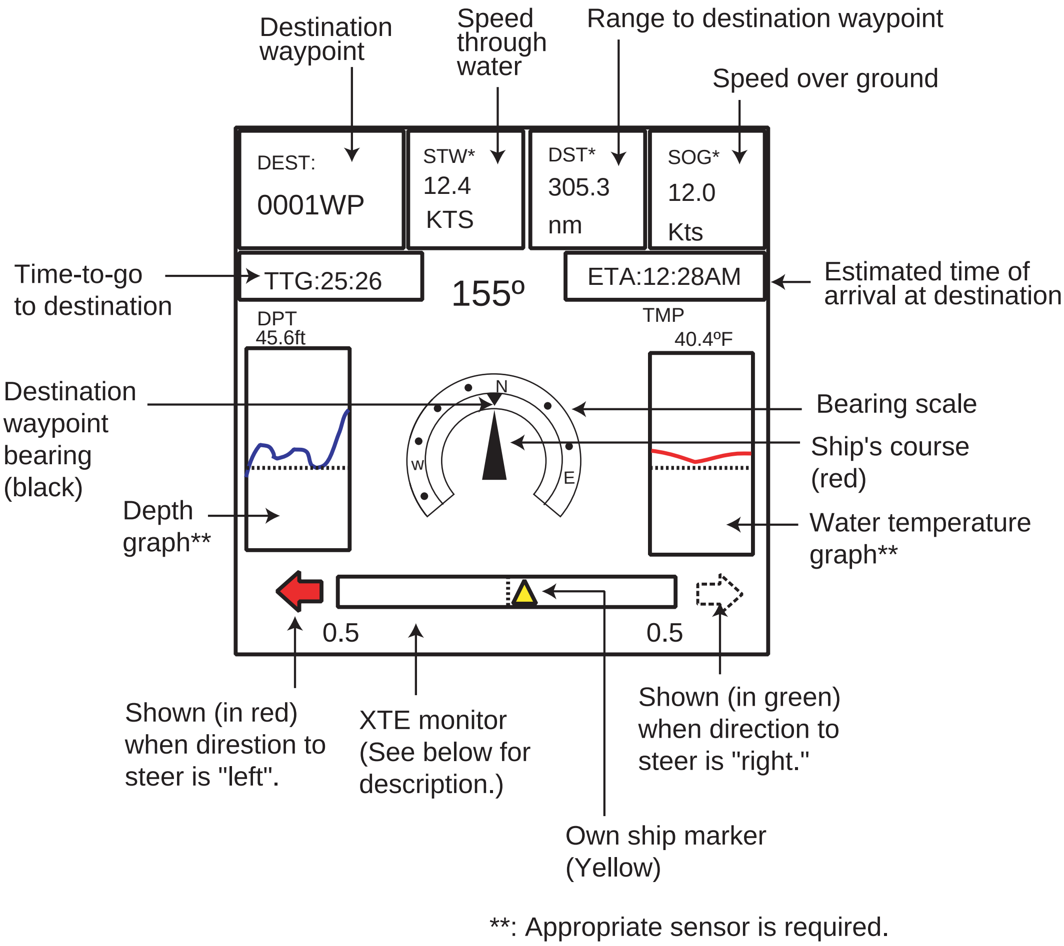
   The item window (ex. units) appears.
5. Rotate [ENTER] knob to select the unit.

   The data selected at step 2 changes to your selection.
6. Press the [CLEAR] key to erase the reverse video.

2.5 Compass Display

The compass display, shown in combination displays, provides steering information. The compass rose shows two triangles: the red triangle shows own ship's course and the black triangle, which moves with ship's course, shows the bearing to destination waypoint.

The water temperature and depth graphs, which require appropriate sensors, shows the latest 10 minutes of water temperature and depth data.



Compass distance

Reading the XTE (cross-track error) monitor

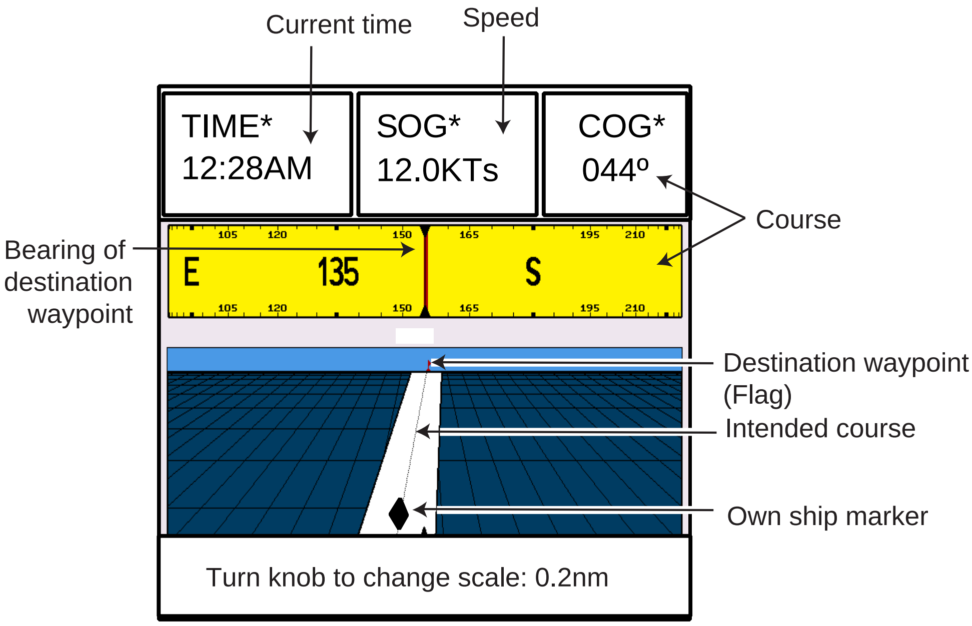
The XTE monitor, located below the compass rose, shows the distance you are off course and the direction to steer to return to course. The own ship marker in the monitor moves according to direction and distance off course. An arrow appears at the right or left side of the XTE monitor and it shows the direction to steer to return to intended course. It is shown in red when you should steer left, and green when you should steer right. In the example above you would steer left to return to course. To maintain course, steer the vessel so the own ship marker stays at the center of the XTE monitor. Note that the XTE range can be changed by rotating the [ENTER] knob.

Nav data

Data marked with * in above can be changed to display. See page 2-5.

2.6 Highway Display

The highway display, shown in combination display with the plotter screen, provides a graphic presentation of ship's track along intended course. It is useful for monitoring ship's progress toward a waypoint. The own ship marker shows the relation between your vessel and intended course.



Highway display

Changing the scale

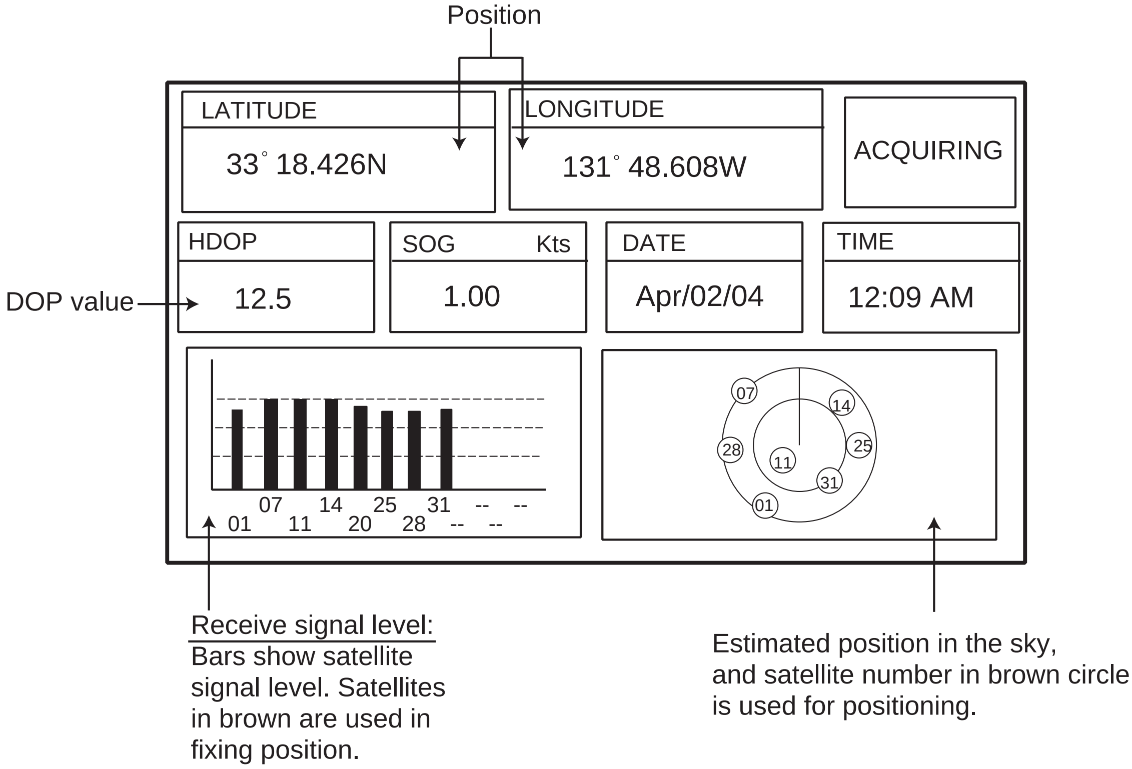
You can change the scale of the highway display to 0.2, 0.5, 1.0, 2.0, 4.0 or 10.0 (nm). Rotate the [ENTER] knob to change it. Note that the available range depends on own ship's position.

Nav data

Data marked with * in above can be changed to display. See page 2-5.

2.7 GPS Status Display

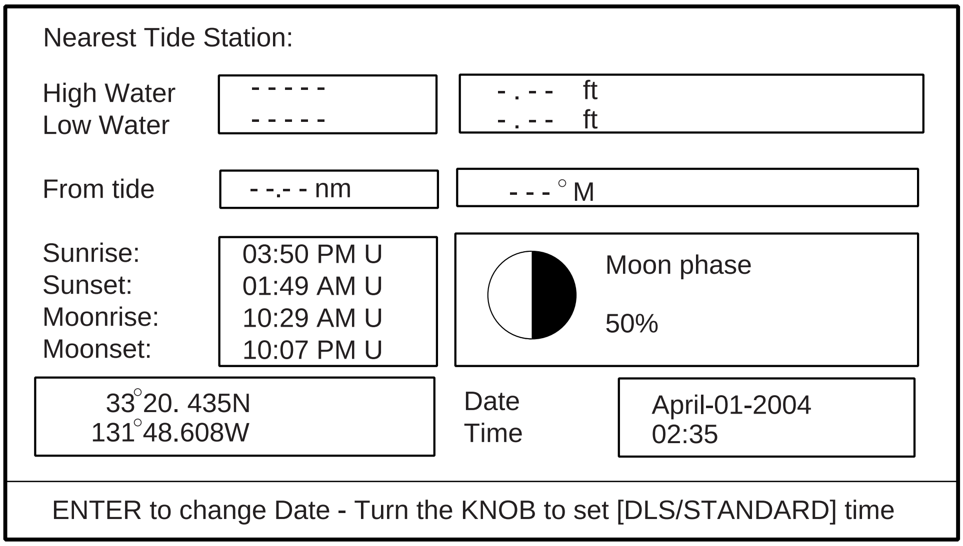
The GPS status display provides data on the GPS satellites.



GPS status display

2.8 Tide, Celestial Display

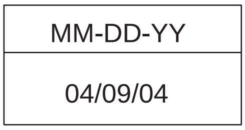
Your plotter provides for calculation of the tide heights for any date. Additionally it displays the time of sunrise, sunset, moonrise and moonset.



Celestial display

Setting the date for calculation

1. Press the [ENTER] knob to show the date window.



Date window

2. Press the cursor pad to move the cursor, and then rotate the [ENTER] knob to choose the date.

   When you want to clear all values, press the CLR FLD soft key.

   To escape, press the CANCEL soft key.

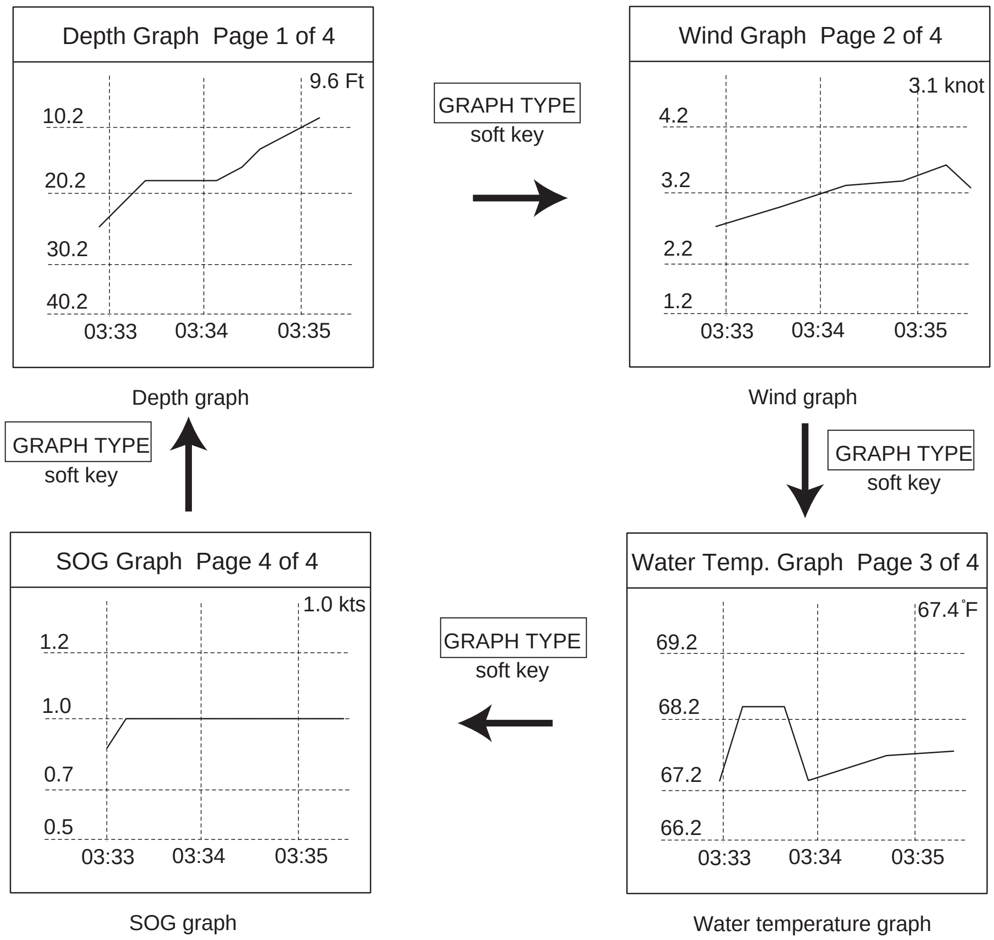
3. Press the SAVE soft key to set.

2.9 Graph Display

Four graphs can be displayed alternately on the half-screen of the LCD: depth, wind, water temperature and SOG (speed).

Press the GRAPH TYPE soft key to choose display graphs in the sequence shown below.

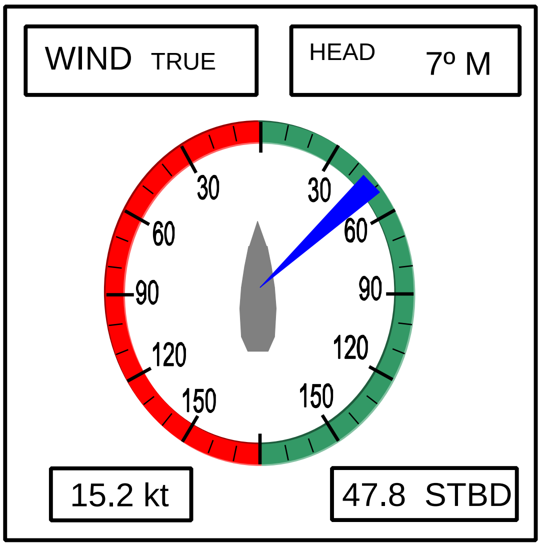
Note: Appropriate sensors required to display graphs.



Sequence of graph display

2.10 Wind Display

Your plotter can show the graphical wind indicator when the appropriate data is input.



Wind display

Selecting the wind direction indication format

The wind direction can be selected to true or apparent.

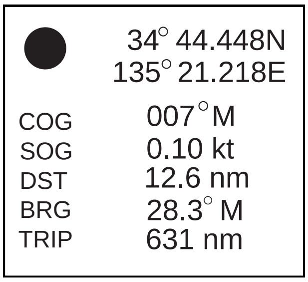
1. Press the [MENU] key to show the menu bar.
2. Rotate the [ENTER] knob to choose GENERAL and then push the [ENTER] knob.
3. Rotate the [ENTER] knob to choose WIND GRAPH and then push the [ENTER] knob.
4. Rotate the [ENTER] knob to select True or Apparent as appropriate.

   True: The Speed and direction (relative to due north)

   Apparent: The direction (in relation to ship's bow) and speed of the wind as it appears to those on board, relative to the speed and direction of the boat; combination of the true wind and the wind caused by the boat's movement.
5. Push the [ENTER] knob.
6. Press the [MENU] key to close the menu.

2.11 NAVDATA Window

The second soft key from the left functions to control the NAVDATA window. Each press of the key changes this soft key label in the sequence of NAV DATA, NAV+CUR and OFF.



NAVDATA window

Customizing the NAVDATA window

1. Press the NAV DATA soft key to show the NAVDATA window if it is not already shown.
2. Press and hold the [MENU] key down for two seconds.
   The data beneath the cursor position is shown in reverse video.
3. Rotate the [ENTER] knob to select the data to change, and then press it.
   A data window similar to the one shown on page 2-5 appears.
4. Rotate the [ENTER] knob to choose data, and then press it.
5. Depending on the data selected, a unit window may appear. In this case, rotate the [ENTER] knob to choose the desired unit, and then press it.
6. Press the [CLEAR] key to erase the reverse video.

Resetting the trip data

1. Press the NAV DATA soft key to show the NAVDATA window if it is not already shown.
2. Press the [CLEAR] key to hide soft keys.
3. Press and hold the [MENU] key down for two seconds to show the cursor in the NAV DATA window.
4. Rotate the [ENTER] knob to choose TRIP.
   The TRP RESET soft key appears at the bottom of screen.
5. Press the TRP RESET soft key to show the confirmation window.
6. Choose YES, and then push the [ENTER] knob to reset the trip data.

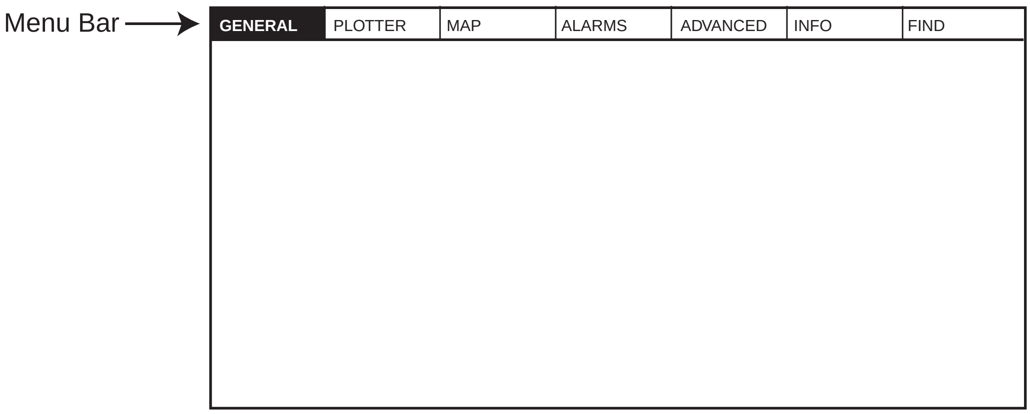
3. TRACK

Your ship's track is plotted on the screen using navigation data fed from the internal GPS navigator. This chapter shows you what you can do with track, from turning it on or off to changing its plotting interval. In the default setting, own ship's track is turned on and is displayed in black.

3.1 Selecting Active Track

Your plotter can plot up to five track lines. It can be useful to have multiple track lines to distinguish tracks according to date or course. Note that other track-related settings are available for the track chosen here.

1. Press the [MENU] key to show the menu bar.



Menu bar

2. Rotate the [ENTER] knob to choose PLOTTER from the menu bar.
3. Push the [ENTER] knob to show the PLOTTER menu.

TRACK	
ROUTES	
WAYPOINTS	
MEMORY CARD	
TRACK	11999/12000
WAYPOINTS	12/2000

Number of tracks and waypoints in use

Plotter menu

4. Rotate the [ENTER] knob to choose TRACK and then push the [ENTER] knob.

TRACKING	**Off**
ACTIVE TRACK	1
VISIBLE	On
LINE COLOR	———
DELETE	
STEP UNIT	Dist
DISTANCE	0.1 Nm
TIME	1 min

Track menu

5. Rotate the [ENTER] knob to choose ACTIVE TRACK and then push the [ENTER] knob.
6. Rotate the [ENTER] knob to choose the desired number of own ship tracks to use, from among 1 to 5.
7. Press the SAVE soft key.
8. Press the [MENU] key to close the menu.

3.2 Displaying Track

To display track line on the screen, do the following.

1. Press the [MENU] key to show the menu bar.
2. Rotate the [ENTER] knob to choose PLOTTER from the menu bar and then push the [ENTER] knob.
3. Rotate the [ENTER] knob to choose TRACK and then push the [ENTER] knob.
4. Rotate the [ENTER] knob to choose TRACKING and then push the [ENTER] knob.
5. Rotate the [ENTER] knob to select On and then push the [ENTER] knob.

   To turn off the track display, select Off here.
6. Press the [MENU] key to close the menu.

3.3 Changing Track Color

Track can be displayed in black (default setting), light-green, red, pink, yellow, gray, brown and dark green. It can be useful to change track color on a regular basis to discriminate the active tracks.

1. Choose TRACK from the PLOTTER menu and then push the [ENTER] knob.
2. Choose LINE COLOR and then push the [ENTER] knob.
3. Rotate the [ENTER] knob to choose the color desired and then push the [ENTER] knob.
4. Press the [MENU] key to close the menu.

3.4 Stopping, Restarting Plotting

When your boat is at anchor or returning to port, you probably won't need to record its track. You can stop recording the track, to conserve the track memory, as below.

1. Choose TRACK from the PLOTTER menu and then push the [ENTER] knob.
2. Choose TRACKING and then push the [ENTER] knob.
3. Rotate the [ENTER] knob to choose Off, and then push the [ENTER] knob.

3.5 Hiding the Track

The track lines can be hidden (but recorded). This function is useful when there are too many tracks to distinguish on the screen and it is hard to distinguish one from another.

1. Choose TRACK from the PLOTTER menu and then push the [ENTER] knob.
2. Choose VISIBLE and then push the [ENTER] knob.
3. Rotate the [ENTER] knob to select On.

   To re-display the track, choose Off.
4. Press the [MENU] key to close the menu.

3.6 Track Plotting Method and Interval

In drawing the own ship track, first the ship's position fed from the internal GPS navigator is stored into the unit's memory at an interval of time or distance. A shorter interval provides for better reconstruction of the track, but the storage time of the track is reduced. When the track memory becomes full, the oldest track is erased to make room for the latest.

3.6.1 Track plotting method

Track may be plotted by time or distance.

1. Choose TRACK from the PLOTTER menu.
2. Choose STEP UNIT and then push the [ENTER] knob.

Dist Time

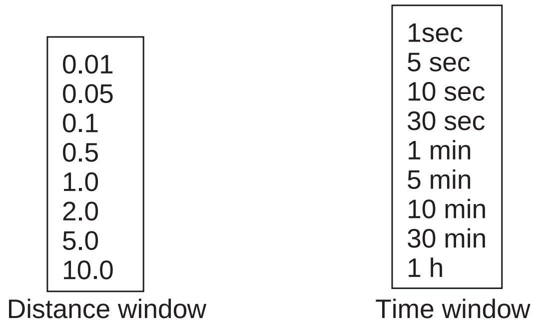
STEP UNIT window

3. Rotate the [ENTER] knob to select Dist (distance) or Time as appropriate.

   Distance is useful for conserving track memory, since no track is recorded when the boat is stationary.
4. Push the [ENTER] knob.
5. Press the [MENU] key to close the menu.

3.6.2 Track plotting interval

1. Choose TRACK from the PLOTTER menu.
2. Choose DISTANCE or TIME as appropriate and then push the [ENTER] knob.



Interval windows

3. Rotate the [ENTER] knob to select setting.
4. Push the [ENTER] knob.
5. Press the [MENU] key to close the menu.

3.7 Erasing Track

This section shows you how to erase the active track.

1. Choose TRACK from the PLOTTER menu.
2. Choose DELETE and then push the [ENTER] knob.



Delete window

3. Push the [ENTER] knob to erase the track.

   To cancel, rotate the [ENTER] knob to choose NO and then push the [ENTER] knob.
4. Press the [MENU] key.

4. WAYPOINT

In navigation terminology, a waypoint is a particular location on a voyage whether it be a starting, intermediate or destination point. A waypoint is the simplest piece of information your equipment requires to get you to a destination, in the shortest distance possible.

This unit has 2,000 waypoints into which you can enter position information. You may enter a waypoint four ways: at own ship position, by cursor, at MOB position (see chapter 1) and through the waypoint list (manual input of latitude and longitude).

4.1 Entering Waypoints

4.1.1 Entering a waypoint at own ship position or cursor position

Turn the cursor off to enter a waypoint at own ship position, or turn it on to enter a waypoint at cursor position.

A newly entered waypoint is saved to the waypoint list, under the youngest empty waypoint number.

1. Press the [MOB/ WPT] key momentarily to store your position as a waypoint.

   When the cursor is displayed, the waypoint is entered at the cursor position.

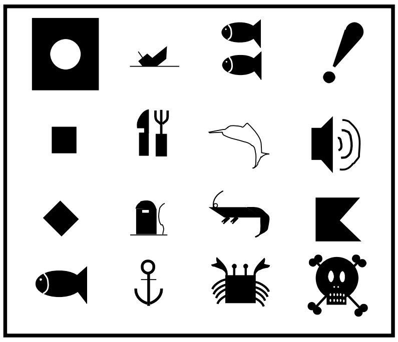
   The new waypoint window appears and it shows waypoint name, position of waypoint, waypoint mark shape and comment for newly entered waypoint.

NAME **0004WP**
LATITUDE/LONGITUDE 47°56.307N 133°56.807W
SHAPE COLOR ■
COMMENT 00:29 APR0204

Waypoint window

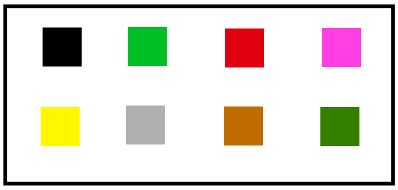
2. If you do not need to change the waypoint data, press the SAVE soft key to register the waypoint. The steps which follow show you how to change waypoint data.
3. NAME is selected; push the [ENTER] knob.

4. Rotate the [ENTER] knob to choose the desired alphanumeric character.
   You can clear all digits in the field by pressing the CLR FLD soft key.
5. Press ▶ to move the cursor to the next digit, and then rotate the [ENTER] knob to choose the character desired.
6. Repeat steps 4 and 5 to complete the name. (Max. 12 characters)
7. Press the SAVE soft key and then rotate the [ENTER] knob to choose the LATITUDE/LONGITUDE section.
8. Push the [ENTER] knob.
9. Use the cursor pad and [ENTER] knob to enter latitude data, and then press the SAVE soft key.
10. Use the cursor pad and [ENTER] knob to enter longitude data, and then press the SAVE soft key.
11. Rotate the [ENTER] knob to choose "SHAPE" in the SHAPE/COLOR section.
12. Push the [ENTER] knob to show the waypoint mark shape selection window.



Waypoint mark shape selection window

13. Rotate the [ENTER] knob to choose shape desired.
14. Push the [ENTER] knob.
15. Rotate the [ENTER] knob to choose "COLOR" and then push the [ENTER] knob.



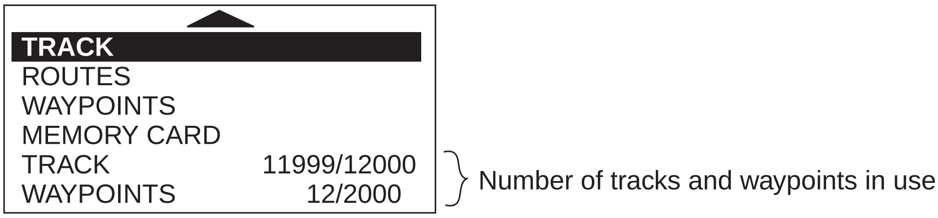
Waypoint mark color selection window

16. Rotate the [ENTER] knob to choose the color desired, then push the [ENTER] knob.
17. Rotate the [ENTER] knob to choose COMMENT section and then push the [ENTER] knob.
18. Use the cursor pad and [ENTER] knob to enter a comment (Max. 13 characters).
19. Press the SAVE soft key twice to register the waypoint.

4.1.2 Entering a waypoint from the waypoint list

You can manually enter waypoint position from the waypoint list as follows.

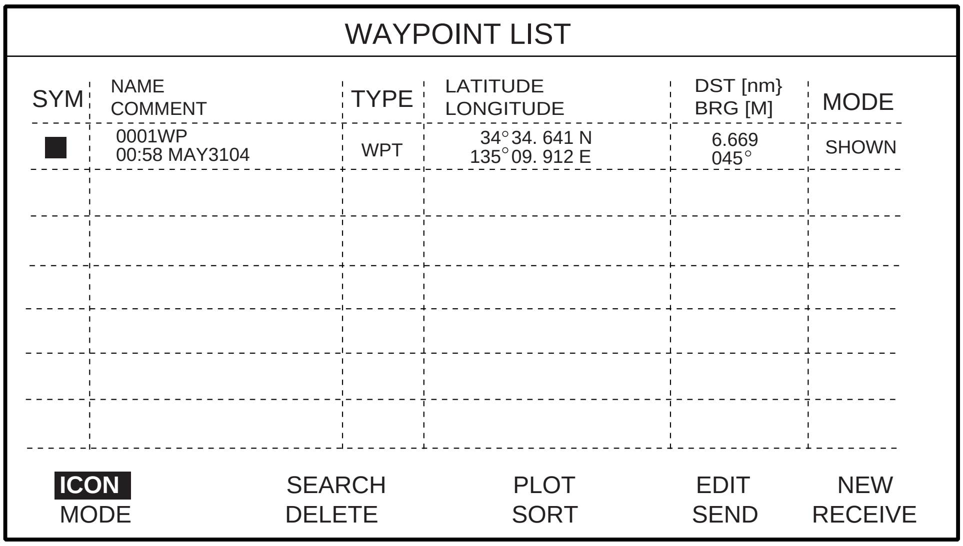
1. Press the [MENU] key to show the menu bar.
2. Rotate the [ENTER] knob to choose PLOTTER and then push the [ENTER] knob to show the PLOTTER menu.



Plotter menu

3. Rotate the [ENTER] knob to choose WAYPOINTS and then push the [ENTER] knob.

   The WAYPOINT LIST is displayed.



Waypoint list

4. Rotate the [ENTER] knob to choose NEW at the bottom of the screen and then push the [ENTER] knob.

   The new waypoint is entered at the current own ship position. (When cursor is turned on, it is entered at the cursor position.)
5. If desired, change waypoint data; choose EDIT (at the bottom of screen) and follow the paragraph 4.2.
6. Press the [CLEAR] key to close the WAYPOINT LIST.

Note 1: The WAYPOINT LIST can also be shown by pressing the WPT/QWP LST soft key, which is shown when the cursor is placed on a waypoint.

Note 2: You can change the page of the WAYPOINT LIST by pressing ◀ or ▶.

4.1.3 Entering a waypoint/MOB mark with an external event switch

If the equipment is equipped with an external event switch you may choose what mark is inscribed on the screen when the switch is pressed. The choices are Waypoint, MOB mark or Off (no event switch is connected).

1. Press the [MENU] key to show the menu bar.
2. Rotate the [ENTER] knob to choose ADVANCED from the menu bar and then push the [ENTER] knob.
3. Rotate the [ENTER] knob to choose INPUT/OUTPUT and then push the [ENTER] knob.
4. Rotate the [ENTER] knob to choose EXTERNAL EVENT and then push the [ENTER] knob.

Off
WPT
MOB

5. Choose Off, WPT or MOB as appropriate and then push the [ENTER] knob.
6. Press the [MENU] key to close the menu.

4.2 Editing Waypoint Data

Waypoint data may be edited from the waypoint list or directly from the plotter display.

4.2.1 Editing waypoint data from the waypoint list

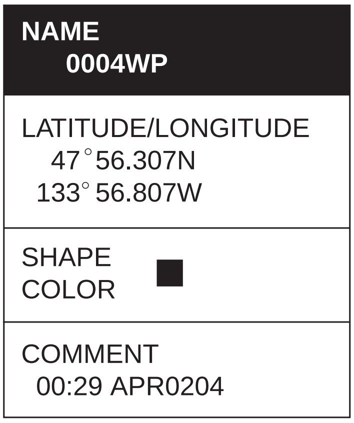
1. Press the [MENU] key to show the menu bar.
2. Rotate the [ENTER] knob to choose PLOTTER and then push the [ENTER] knob.
3. Rotate the [ENTER] knob to choose WAYPOINTS and then push the [ENTER] knob to show the WAYPOINT LIST.
4. Press the cursor pad (▲ ▼) to choose the waypoint you want to edit.
5. Rotate the [ENTER] knob to choose EDIT at the bottom of screen.
6. Push the [ENTER] knob.
7. Press the cursor pad (◀ ▶) to place the cursor on the appropriate column, and then push the [ENTER] knob.
8. Edit data as appropriate, and then push the [ENTER] knob.
9. Press the [CLEAR] key to close the list.

4.2.2 Editing a waypoint from the plotter display

You may edit waypoints from the plotter display two ways: from the waypoint window or directly on the plotter display.

<u>From waypoint window</u>

1. Operate the cursor pad to place the cursor on the waypoint you want to edit.
2. Press the EDIT soft key to show the waypoint window.



Waypoint window

3. Edit data as appropriate referring to paragraph 4.1.1, and then press the SAVE soft key.

<u>Directly on plotter display</u>

Operate the cursor pad to place the cursor on the waypoint to edit, and then press the MOVE soft key. The color of the selected waypoint changes to blue, and black line runs between it and the cursor. Operate the cursor pad to select the new position, and then push the [ENTER] knob.

4.3 Erasing Waypoints

Waypoints can be erased from the waypoint list or directly from the plotter display.

4.3.1 Erasing a waypoint directly from the plotter display

1. Press the cursor pad to place the cursor on the waypoint you want to delete.
2. Press the DELETE soft key.

   The following window appears.

WARNING
Delete 0001WP Are you sure? **YES** NO

3. Push the [ENTER] knob.

   The color of the selected waypoint at step 1 changes to blue. To erase completely, press the [RANGE] key.

4.3.2 Erasing a waypoint from the waypoint list

1. Press the [MENU] key to show the menu bar.
2. Choose PLOTTER followed by WAYPOINTS, and then push the [ENTER] knob to show the WAYPOINT LIST.
3. Press the cursor pad (▲ ▼) to choose the waypoint you want to delete.
4. Rotate the [ENTER] knob to choose DELETE at the bottom of the screen, and then push the [ENTER] knob.

MODE
DELETE SELECTED DELETE ALL

5. Rotate the [ENTER] knob to select DELETE SELECTED, and then push the [ENTER] knob.

   If you want to delete all waypoints in the list, choose DELETE ALL.

WARNING
Delete points Are you sure? **YES** NO

6. You are asked if you are sure to delete selected waypoint (s). Push the [ENTER] knob to delete, or choose NO and push the [ENTER] knob to escape.
7. Press the [CLEAR] key to finish.

4.4 Searching, Sorting Waypoints

You can search and sort waypoints on the waypoint list as follows.

Searching by waypoint name

1. Open the WAYPOINT LIST.
2. Rotate the [ENTER] knob to choose SEARCH at the bottom of the screen.
3. Push the [ENTER] knob.
4. Enter the waypoint name you want to find, and then press the SAVE soft key.
   The cursor moves on the chosen waypoint name on the list.
5. Press the [CLEAR] key to close the list.

Sorting waypoints

1. Open the WAYPOINT LIST.
2. Rotate the [ENTER] knob to choose SORT at the bottom of the screen.
3. Push the [ENTER] knob to show the item window.

A-Z ASCENDING
Z-A DESCENDING
DISTANCE ASC
DISTANCE DESC

Sort window

4. Rotate the [ENTER] knob to choose a sorting method.
   A-Z ASCENDING: Sorting waypoints in ascending alphanumeric order.
   Z-A DESCENDING: Sorting waypoint in descending alphanumeric order.
   DISTANCE ASC: Sorting waypoints in order of increasing distance to own ship.
   DISTANCE DESC: Sorting waypoints in order of decreasing distance to own ship.
5. Push the [ENTER] knob.
6. Press the [CLEAR] key to close the list.

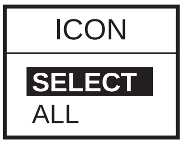
4.5 Other Waypoint List Functions

This section shows you how to execute the various functions available on the WAYPOINT LIST.

4.5.1 Filtering waypoints by mark shape

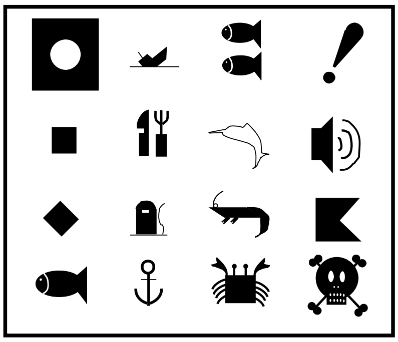
You may filter waypoints in the waypoint list by mark shape. This is useful when you are looking for waypoints of a specific shape.

1. Open the WAYPOINT LIST.
2. Rotate the [ENTER] knob to choose ICON at the bottom of screen.
3. Push the [ENTER] knob to show the ICON window.



4. Rotate the [ENTER] knob to choose SELECT and then push the [ENTER] knob.

   The waypoint mark shape selection window appears.



Waypoint mark shape selection window

   Note: ALL shows all waypoints.

5. Rotate the [ENTER] knob to choose the mark shape which you want to search, and then push the [ENTER] knob.

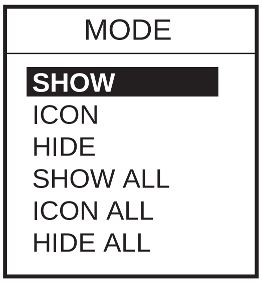
   The list shows waypoints with the chosen mark shape.
6. Press the [CLEAR] key twice to close the list.

   To display all waypoints, choose ALL at step 4 and then press the [CLEAR] key.

4.5.2 Hiding or showing waypoints

Waypoints can be shown or hidden individually or collectively on the plotter display as below.

1. Open the WAYPOINT LIST.
2. Press the cursor pad (▲ ▼) to choose the waypoint you want to show or hide.
   All waypoints can also be shown or hidden.
3. Rotate the [ENTER] knob to choose MODE at the bottom of screen, and then push the [ENTER] knob.



Mode window

4. Rotate the [ENTER] knob to choose option desired.
   SHOW: Shows the name and mark of the waypoint selected at step 2.
   ICON: Shows only the mark of the waypoint selected at step 2.
   HIDE: Hides the name and mark of the waypoint selected at step 2.
   SHOW ALL: Shows the names and marks of all waypoints.
   ICON ALL: Shows only marks of all waypoints.
   HIDE ALL: Hides the names and marks of all waypoints.
5. Push the [ENTER] knob.
6. Press the [CLEAR] key to close the menu.

4.5.3 Searching waypoints

You can search for waypoint by name as follows.

1. Open the WAYPOINT LIST.
2. Press the cursor pad (▲ ▼) to choose the waypoint desired.
3. Choose PLOT at the bottom of the screen.
4. Push the [ENTER] knob.
   The plotter display appears with the waypoint chosen at step 2 at the screen center.

This page is intentionally left blank.

5. ROUTE

Often a trip from one place to another involves several course changes, requiring a series of route points (waypoints) which you navigate to, one after another. The sequence of waypoints leading to the ultimate destination is called a route.

5.1 Entering Routes

You can store up to 200 routes and a route may consist of 35 points.

1. Press the [MENU] key to show the menu bar.
2. Rotate the [ENTER] knob to choose PLOTTER and then push the [ENTER] knob to show the PLOTTER menu.

TRACK	
ROUTES	
WAYPOINTS	
MEMORY CARD	
TRACK	11999/12000
WAYPOINTS	12/2000

Number of tracks and waypoints in use

Plotter menu

3. Rotate the [ENTER] knob to choose ROUTES and then push the [ENTER] knob to show the route list.

   Note: The route list can also be shown by placing the cursor on a waypoint and then pressing the ROUTE LIST soft key.

ROUTE LIST

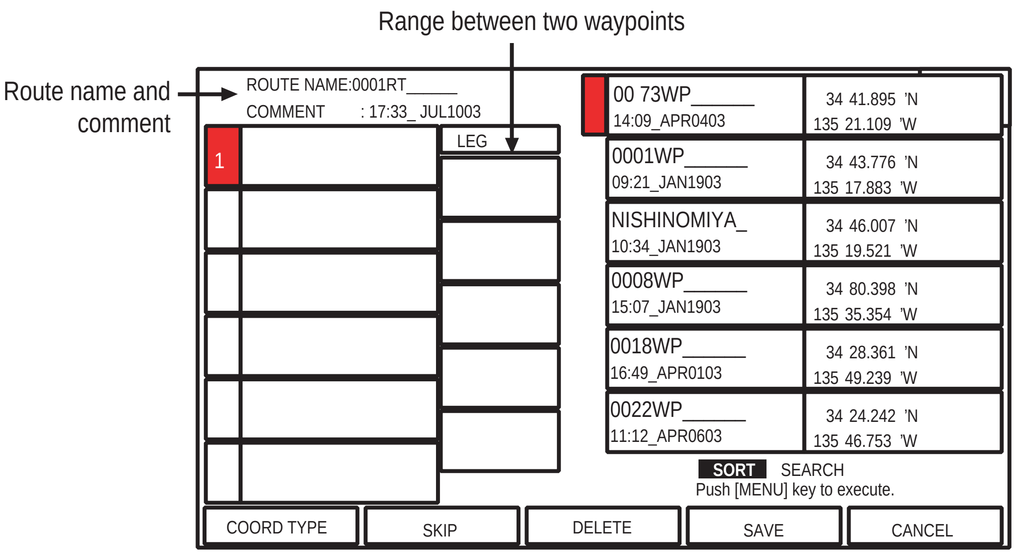
N	NAME	COMMENT	LENGTH	WAYPOINTS
1	0001RT	00:10 MAY3104	1.901 nm	3

FIND	NEW	EDIT	RENAME	COMMENT
PLOT	DELETE	REVERSE	COLOR	SEARCH
SEND	RECEIVE	CONNECT	SELECT	REPORT

Route list

4. Rotate the [ENTER] knob to choose NEW at the bottom of screen and then push the [ENTER] knob to show the new route menu.

   The new route is automatically named with the youngest empty route number and current date is used as the comment. Name and comment may be changed if desired.



New route menu

5. Rotate the [ENTER] knob to choose a waypoint, and then push the [ENTER] knob.
6. Choose the waypoints in the sequence you want to follow them.

   You can find waypoints by using the SORT or SEARCH function.

   Choose SORT or SEARCH at the bottom right-hand side of the screen as appropriate and then press the [MENU] key.

   SORT: Sorting waypoints distance (ascending or descending) or alphabetical (ascending or descending).

   SEARCH: Enter the waypoint name desired.
7. Press the SAVE soft key to register the route.
8. Press the [CLEAR] key to close the list.

5.2 Changing the Route Name/Comment

You can change the route name or comment as follows:

1. Open the route list.
2. Press the cursor pad (▲ ▼) to choose the route you want to edit.
3. Rotate the [ENTER] knob to choose RENAME at the bottom of screen and then push the [ENTER] knob.

   To change comments, choose COMMENT and then push the [ENTER] knob.
4. Edit the route name as appropriate.

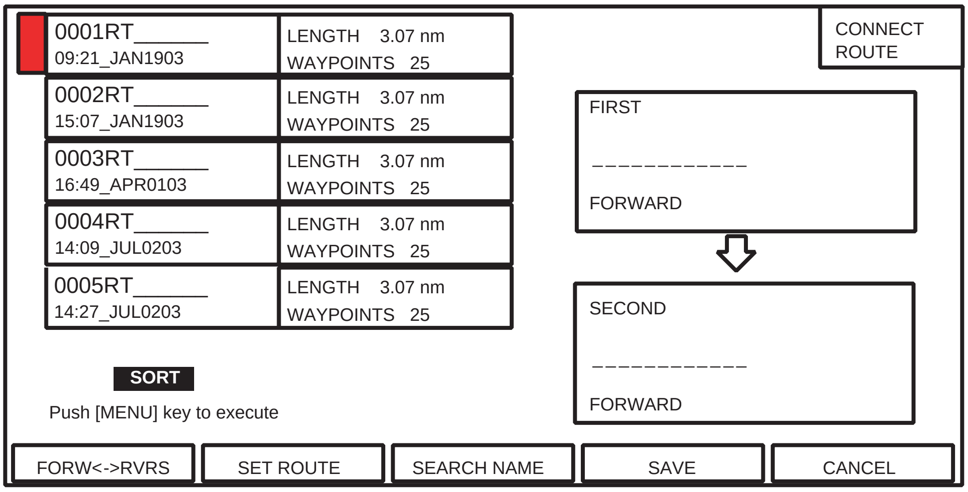
   Press the cursor pad to move the digit cursor.
5. Press the SAVE soft key.
6. Press the [CLEAR] key to close the list.

5.3 Connecting Routes

Two routes which you have created can be connected as follows to form a new route.

1. Open the route menu.
2. Rotate the [ENTER] knob to choose CONNECT at the bottom of screen and then push the [ENTER] knob.

   The connect route menu appears.



Connect route menu

3. Rotate the [ENTER] knob to choose the first route and then push the [ENTER] knob.

   The selected route name is shown in the "FIRST" window.
4. Press the FORW <-> RVRS soft key to select the direction to follow the waypoints of the route, forward or reverse.
5. Press ▼ to place the cursor on the "SECOND" window.
6. Rotate the [ENTER] knob to choose the second route, and then push the [ENTER] knob.
7. Press the SAVE soft key.
8. Press the [CLEAR] key twice to close the menu.

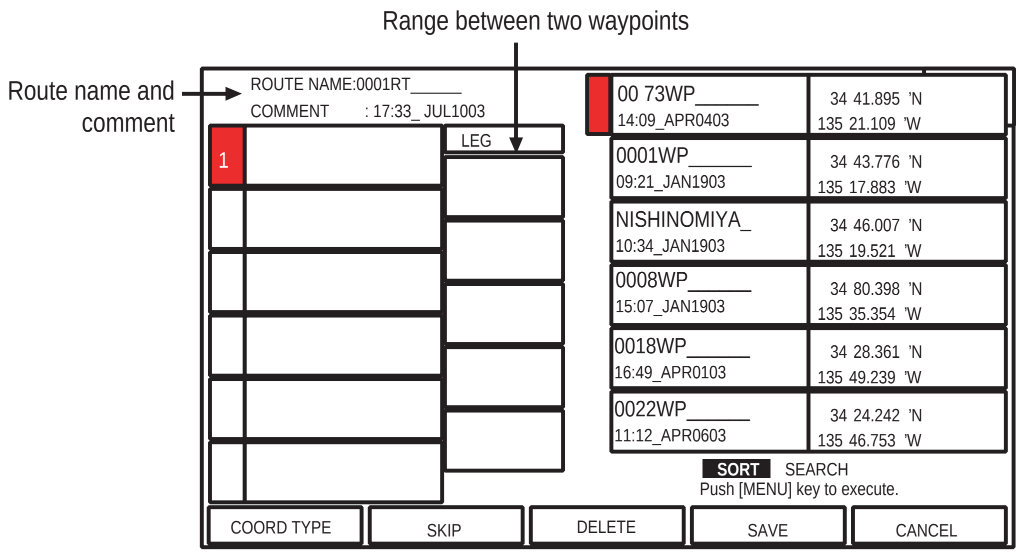
Note: The maximum number of waypoints in a route is 35. If this number is exceeded an error message appears. In this case, delete waypoints in one or both routes so the total number of waypoints does not exceed 35.

5.4 Inserting Waypoints

Waypoints can be inserted in a route as follows:

Inserting a waypoint from the route list

1. Show the route list.
2. Press the cursor pad (▲ ▼) to choose a route.
3. Rotate the [ENTER] knob to choose EDIT at the bottom of screen and then push the [ENTER] knob to show the route menu.



Route menu

4. Press the cursor pad (▲ ▼) to place the cursor at the location where you want to insert a waypoint.
5. Rotate the [ENTER] knob to choose the waypoint you want to insert. (You can search for a waypoint by the SORT or SEARCH function.)
6. Push the [ENTER] knob to enter the waypoint.
7. Press the SAVE soft key to close the route menu.
8. Press the [CLEAR] key to close the route list.

Inserting a waypoint from the plotter display

You can insert a waypoint in a route directly on the screen.

1. Press the cursor pad to place the cursor on the desired line between waypoints in a route.

   The window below appears.

   ```
   ROUTE:  1   [0001RT]
    0001WP - 0002WP

   DST:   4.74 nm
   BRG:   102  M
   ```

   Leg window (ex.)

2. Press the INSERT soft key.

   The selected line (dashed) turns red.

3. Operate the cursor pad to place the cursor on an existing waypoint and then push the [ENTER] knob.

   The route is then redrawn to include the newly inserted waypoint.

5.5 Removing Waypoints from a Route

Removing a waypoint from the route list

1. Show the route list.
2. Press the cursor pad (▲ ▼) to choose a route.
3. Rotate the [ENTER] knob to select EDIT at the bottom of screen and then push the [ENTER] knob to show the route menu.
4. Press the cursor pad (▲ ▼) to choose the waypoint you want to remove.
5. Press the DELETE soft key.
6. Press the SAVE soft key.
7. Press the [CLEAR] key to close the list.

Removing a waypoint from the plotter display

1. Press the cursor pad to place the cursor on the waypoint you want to remove from a route.
2. Press the DELETE soft key.

   ```
   WARNING

   Delete 0001WP
   Are you sure?

   YES     NO
   ```

3. Push the [ENTER] knob.

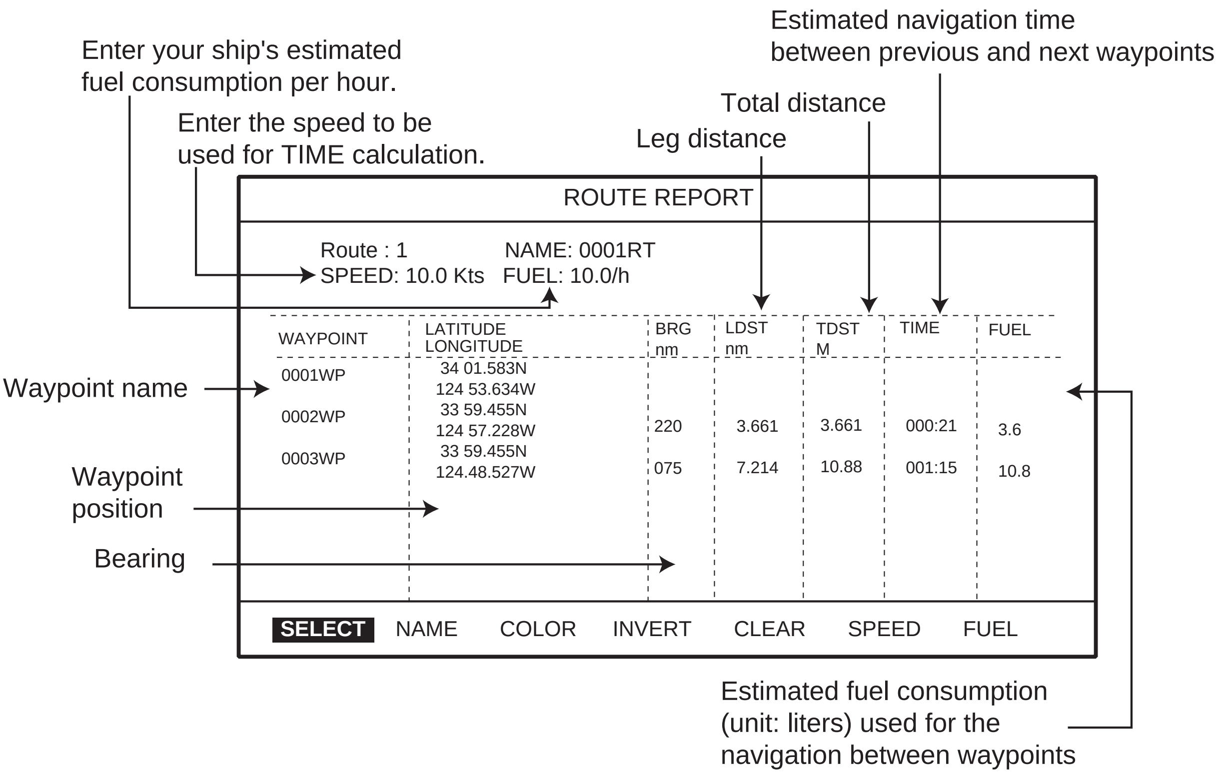
   The route is redrawn, eliminating the waypoint removed.

5.6 Information on Route Report

The route report provides various information about routes, such as time distance and necessary fuel to go to a waypoint in route.

1. Open the route list.
2. Press the cursor pad (▲ ▼) to choose the route desired.
3. Rotate the [ENTER] knob to choose REPORT at the bottom of screen and then push the [ENTER] knob.

   The route report for the route appears.



Route report

4. Press the [CLEAR] key twice to close the route report.

<u>Entering the speed for TIME column</u>

Enter speed to be used for TIME calculation.

1. Show the route report.
2. Rotate the [ENTER] knob to choose SPEED at the bottom of screen and then push the [ENTER] knob to show the SPEED window.

   SPEED 10.0 kt

   You can change the digit by pressing the cursor pad (◀ ▶).
3. Enter the ship's speed and then SAVE soft key.

<u>Entering the fuel consumption for FUEL column</u>

Enter your ship's estimated fuel consumption per hour to calculate fuel consumption used for the route navigation.

1. Show the route report.
2. Rotate the [ENTER] knob to choose FUEL at the bottom of screen and then push the [ENTER] knob to show the FUEL window.

   FUEL 010.0 kt
3. Enter the fuel consumption of your boat.

   You can change the digit by pressing the cursor pad (◀ ▶).
4. Press the SAVE soft key.

5.7 Changing the Color of Route Line

You can select the color for the route line among 8 colors: black, light-green, red, pink, yellow, gray, brown and dark green.

1. Open the route list.
2. Press the cursor pad (▲ ▼) to choose a route.
3. Rotate the [ENTER] knob to choose COLOR at the bottom of screen and then push the [ENTER] knob.

   The color window appears.
4. Rotate the [ENTER] knob to choose a color.
5. Push the [ENTER] knob.
6. Press the [CLEAR] key to close the menu.

5.8 Searching Routes

You can search for a route through the route list or on the plotter display.

Searching a route through the route list

1. Open the route list.
2. Rotate the [ENTER] knob to choose SEARCH at the bottom of screen.
3. Push the [ENTER] knob.
   The NAME window appears.



Name window

4. Enter the route name you want to search.
   You can change the digit by pressing the cursor pad (◀ ▶).
5. Push the SAVE soft key.
   The selected route name is shown at the top of the list.
6. Press the [CLEAR] key to close the menu.

Searching a route on the plotter display

1. Open the route list.
2. Press the cursor pad (▲ ▼) to choose the route desired.
3. Rotate the [ENTER] knob to choose PLOT at the bottom of screen.
4. Push the [ENTER] knob.
   The plotter display appears with the chosen route at the screen center.

5.9 Reversing the Waypoints Order in a Route

The order of waypoints in a route can be reversed as follows.

1. Open the route list.
2. Press the cursor pad (▲ ▼) to choose the route desired.
3. Rotate the [ENTER] knob to choose REVERSE at the bottom of the screen.
4. Push the [ENTER] knob to reverse the waypoints order in the route.
5. Press the [CLEAR] key to close the list.

5.10 Erasing Routes

You can erase routes as follows:

1. Open the route list.
2. Press the cursor pad (▲ ▼) to choose the route you want to erase.
3. Rotate the [ENTER] knob to choose DELETE at the bottom of screen.
4. Press the [ENTER] knob twice to erase.
5. Press the [CLEAR] key to close the route list.

6. NAVIGATION

This chapter shows you how to get to a desired destination by using "quick points", waypoints, port services and routes.

6.1 Navigating to Quick Points

The quick points feature allows you to navigate to a cursor-selected location. Each time a quick point is entered, the previous quick point is written over.

Navigating to a quick point

1. Operate the cursor pad to place the cursor at the location where you want to enter a quick point.
2. Press the [TLL/GOTO] key to show the GO TO window.

CURSOR
POSITION
ROUTE
WAYPOINT

GO TO window

3. Rotate the [ENTER] knob to choose CURSOR and then push the [ENTER] knob.

   A line connects between own ship and destination, marked "DEST," and it shows the shortest course to the destination. The destination is marked with a flag.

   Also, range and bearing from own ship to the destination appear in the data window. This location is saved to the WAYPOINT LIST as waypoint "DEST."

FIX→□ DEST	
34°35. 897N 135°16. 763E	
DST	BRG
3.29nm	202° M

Quick point data window

You can also set the quick point by manually entering the longitude and latitude of the point. Choose POSITION at step 3 to do this.

To cancel the navigation, locate the cursor on the quick waypoint and then press the STOP soft key.

Navigating a quick route

1. Press the cursor pad to place the cursor at the position where you want to enter a waypoint.
2. Press the [ROUTE] key to show the new waypoint window.
3. If necessary, arrange the waypoint data.
4. Press the SAVE soft key.
5. Repeat steps 1 through 4 to complete the route.

   Maximum 35 points can be entered. To erase a waypoint, place the cursor on the waypoint which you want to erase and then press the DELETE soft key.
6. Press the cursor pad to place the cursor on the first quick point of the route.
7. Press the [TLL/GOTO] key.

   A line connects between own ship and the all quick points. The line shows the shortest course between quick points. Arrows on the line show the direction to follow the route. Range and bearing from own ship to the first destination appears in the data window.

   To stop the navigation, place the cursor on the current destination and then press the STOP soft key.

Note: You can continue to add the quick point up to 35 points. If you want to create a new quick route, place the cursor on a leg in the route and then press the RELEASE soft key.

Creating a quick pattern route (SAR function)

The SAR (Search and Rescue) function automatically creates and saves routes in one of three set patterns. The three patterns are EXPANDING SQUARE, CREEPING LINE AHEAD and CIRCULAR. To create and save a route by the SAR function, do the following:

1. Press the [ROUTE] key followed by SAR PATTERN soft key to show the SAR PATTERN window.

SAR PATTERN
EXPANDING SQUARE
CREEPING LINE AHEAD
CIRCULAR

SAR PATTERN window

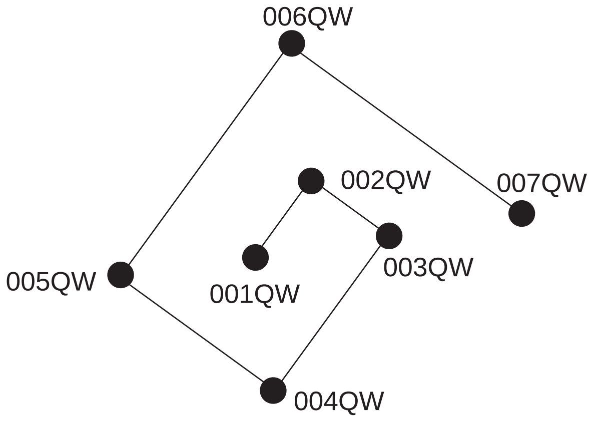
2. Rotate the [ENTER] knob to choose a pattern, and then push the [ENTER] knob to show the appropriate setting window.
3. Set up the window referring to the next several pages.

Note 1: The route created with the Search and Rescue function is saved to the route list under the youngest empty route number.

Note 2: The starting point of the route will be cursor position if the cursor is displayed. If not displayed, the own ship's position will be the starting point.

EXPANDING SQUARE

This route is created with a spiral pattern.



Example of EXPANDING SQUARE pattern

To set an expanding square route, do the following:

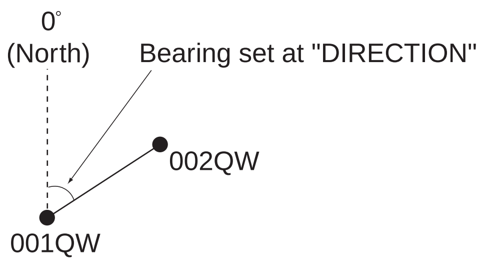
1. Press the [ROUTE] key followed by SAR PATTERN soft key to show the pattern window.
2. Rotate the [ENTER] knob to choose EXPANDING SQUARE and then push the [ENTER] knob to show the EXPANDING SQUARE setting window.

   The cursor chooses the first digit of DIRECTION automatically.

DIRECTION	008° M
SPACE	000.5 nm
WPTs	07
ROTATION	R

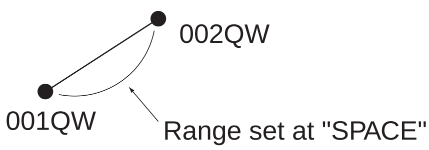
EXPANDING SQUARE setting window

3. Rotate the [ENTER] knob to choose the bearing of the second waypoint from the first waypoint and then press the SAVE soft key. (Setting range: 0 to 359°, North is 0° axis.)



   The cursor moves to the first digit of SPACE automatically.

4. Rotate the [ENTER] knob to set the range between the first waypoint and the second waypoint and then press the SAVE soft key. (Setting range: 1 to 999.9 nm)

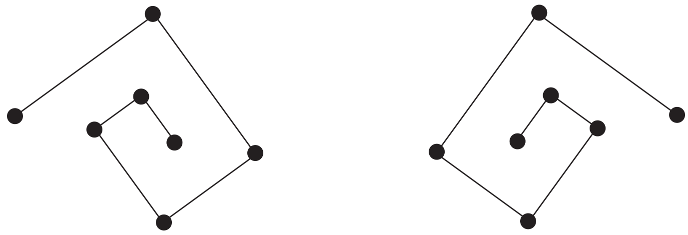


The cursor moves to the WPTs setting automatically.

5. Rotate the [ENTER] knob to choose the number of waypoints to use in a route and then press the SAVE soft key. (Setting range: 1 to 35 points)

   The cursor moves to ROTATION setting automatically.

6. Rotate the [ENTER] knob to choose the direction of spiral, L: counterclockwise, R: clockwise.

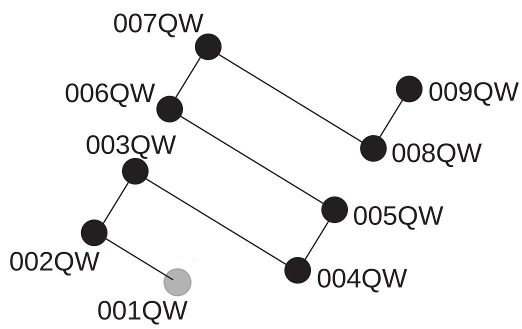


"L" direction of spiral "R" direction of spiral

7. Press the SAVE soft key to store the route in the route list.

CREEPING LINE AHEAD

This route is created with a zigzag pattern.



Example of CREEPING LINE AHEAD pattern

To set a creeping line ahead route, do the following:

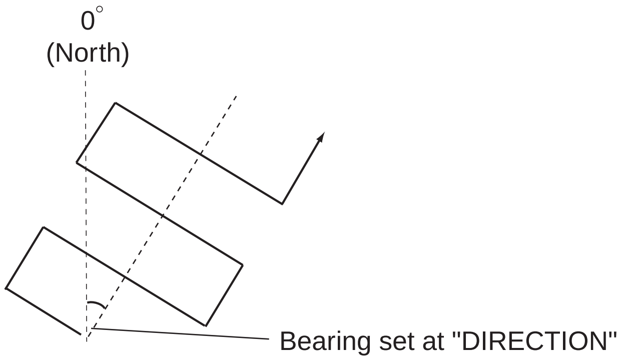
1. Press the [ROUTE] key followed by SAR PATTERN soft key to show the pattern window.
2. Rotate the [ENTER] knob to choose CREEPING LINE AHEAD and then push the [ENTER] knob to show the CREEPING LINE AHEAD setting window.

   The cursor chooses the first digit of DIRECTION automatically.

DIRECTION	008°M
SPACE	000.2 nm
LENGTH	000.5 nm
WPTs	09
ROTATION	L

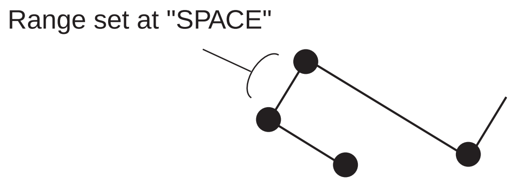
CREEPING LINE AHEAD setting window

3. Rotate the [ENTER] knob to set the bearing which the route follows, and then press the SAVE soft key. (Setting range: 0 to 359°, North is 0° axis.)



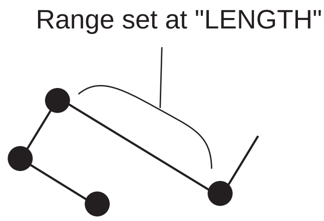
The cursor moves to the first digit of SPACE automatically.

4. Rotate the [ENTER] knob to set the range between two waypoints in longitudinal direction at SPACE and then press the SAVE soft key. (Setting range: 0 to 999.9 nm)



The cursor moves to the first digit of LENGTH automatically.

5. Rotate the [ENTER] knob to set the range between two waypoints in cross direction at LENGTH and then press the SAVE key. (Setting range: 0 to 999.9 nm)

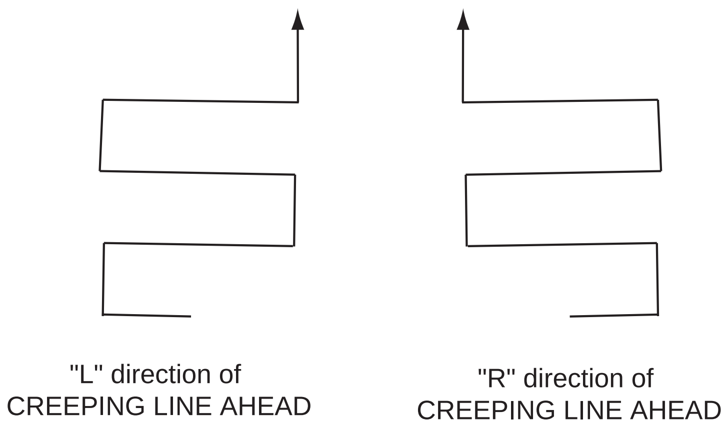


The cursor moves to the WPTs setting automatically.

6. Rotate the [ENTER] knob to choose the number of waypoints at WPTs and then press the SAVE soft key. (Setting range: 1 to 35 points)

The cursor moves to the ROTATION setting automatically.

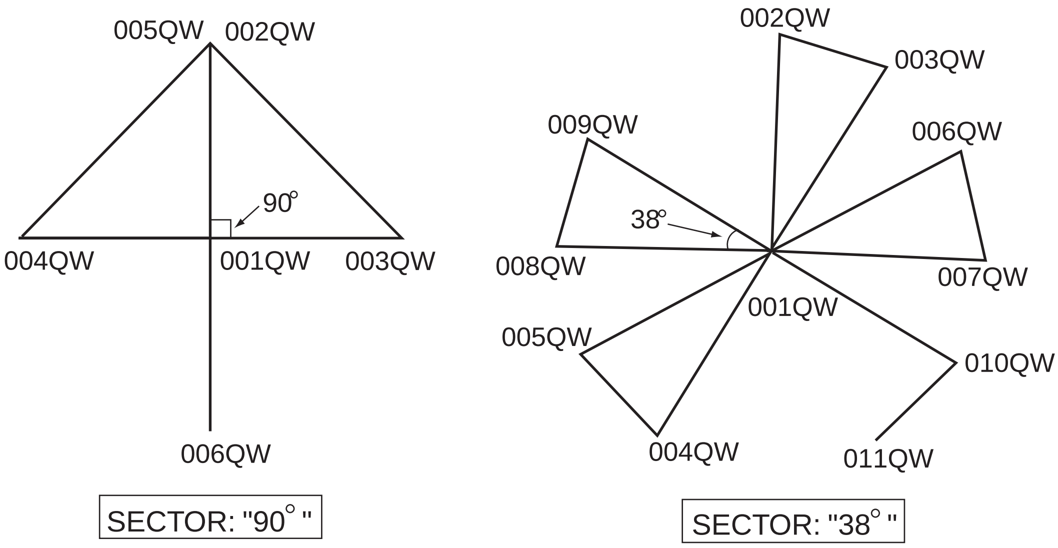
7. Rotate the [ENTER] knob to choose the direction which the route is to follow, L: left, R: right.



8. Press the SAVE soft key to store the route in the route list.

CIRCULAR

The route is created with a "flower" pattern. The shape of a CIRCULAR pattern may be adjusted by changing the setting of "SECTOR". The following shows the examples of routes when SECTOR is set to "90°" and "38°".



Example of CIRCULAR pattern

To set a circular route, do the followings:

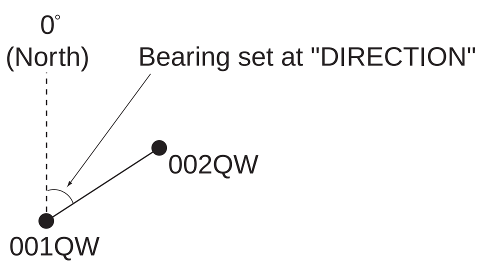
1. Press the [ROUTE] key followed by SAR PATTERN soft key to show the pattern window.
2. Rotate the [ENTER] knob to choose CIRCULAR and then push the [ENTER] knob.

   The cursor chooses the first digit of DIRECTION automatically.

DIRECTION	000°M
SECTOR	090°
LENGTH	001.0 nm
ROTATION	R

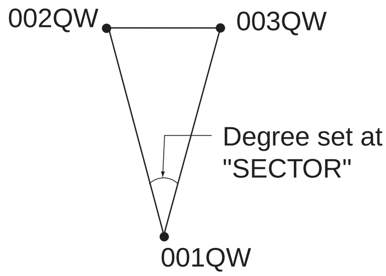
CIRCULAR setting window

3. Rotate the [ENTER] knob to set the bearing of the first waypoint and then push the [ENTER] knob. (Setting range: 0 to 359°, North is 0° axis.)



   The cursor moves to the first digit of SECTOR automatically.

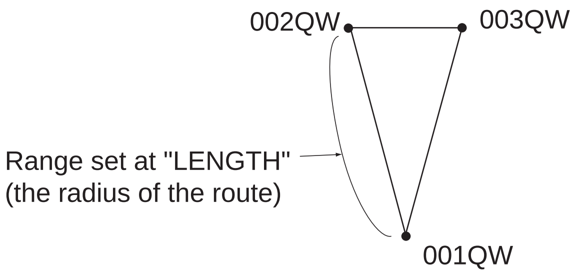
4. Rotate the [ENTER] knob to set the angle of an isosceles triangle formed by three waypoints and then push the [ENTER] knob. (Setting range: 0 to 359°)



Note: The number of waypoints used in a route will be "n/360+2 (n=SECTOR setting)".

The cursor moves to the first digit of LENGTH automatically.

5. Rotate the [ENTER] knob to set the radius for the circle and then push the [ENTER] knob. (Setting range: 0 to 999 nm)

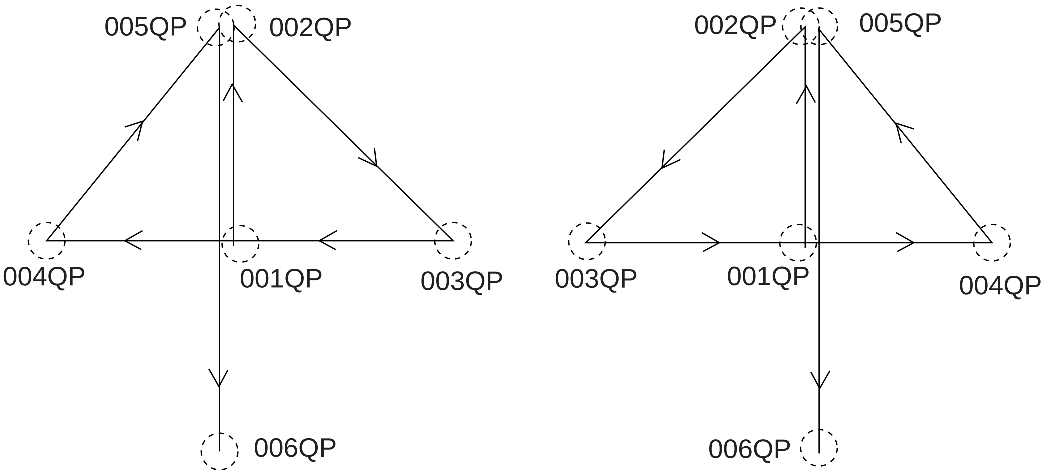


The cursor moves to ROTATION setting automatically.

6. Rotate the [ENTER] knob to choose L or R and then push the [ENTER] knob.

   L: The first turn is made in left direction.

   R: The first turn is made in right direction.



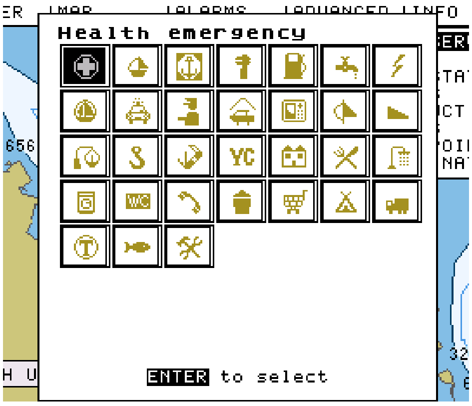
"L" directon of CIRCULAR "R" direction of CIRCULAR

7. Press the SAVE soft key to store the route in the list.

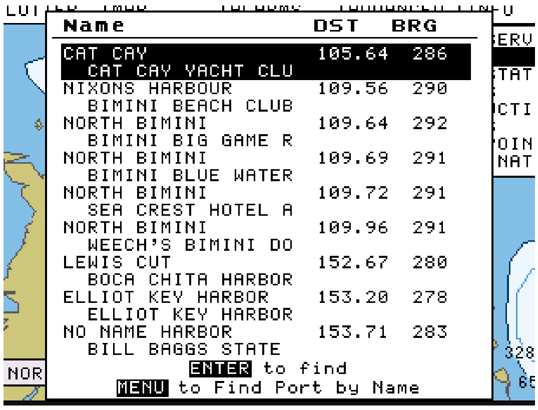
Navigating to ports, port service

C-MAP NT+/NT MAX™ chart cards have a port service list which shows services available at ports and harbors. You can use the list to set destination as follows.

1. Press the [MENU] key to show the menu bar.
2. Rotate the [ENTER] knob to choose FIND and then push the [ENTER] knob.
3. Rotate the [ENTER] knob to choose PORT SERVICES or PORT and then push the [ENTER] knob to show the appropriate window.



Port service window

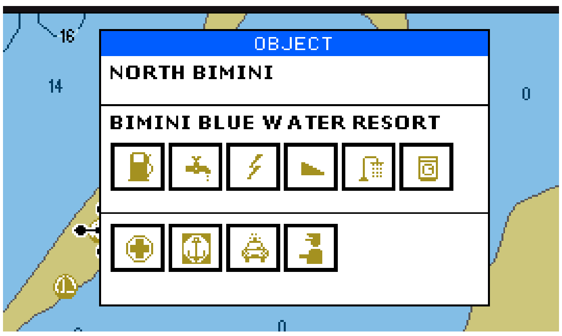


Port window

4. Do one of the following depending on selection made at step 3.

PORT SERVICES

Select service mark desired with the [ENTER] knob, and then push the [ENTER] knob. Then, the display shows the location of those services.
The appropriate port names are shown in order of distance from own ship.
Rotate the [ENTER] knob to choose the port desired and push the [ENTER] knob twice. The service marks of the selected port appear. If you are okay to set this port as destination, press the [ENTER] knob to close the window. Confirm that the cursor is located on the selected port, and then press the [TLL/GOTO] key. Choose CURSOR and then push the ENTER knob.



Sample filling station, service marks

PORT

Press the cursor pad (▲ ▼) to choose port and then press the [ENTER] knob. Press the [ENTER] knob three times. Press the [TLL/GOTO] key, choose CURSOR and then push the [ENTER] knob.

6.2 Navigating to Waypoints

You can select an existing waypoint as destination by cursor, by name or through the WAYPOINT LIST.

To cancel the navigation, locate the cursor on the destination waypoint, and then press the STOP soft key.

Selecting waypoint by cursor

1. Press the cursor pad to place the cursor on the waypoint which you want to set as destination.
2. Press the [TLL/GOTO] key.

   A line runs between waypoint selected and own ship's position. Also, range and bearing from own ship's position to waypoint appear in the data window.

Selecting waypoint by name

1. Press the cursor pad to place the cursor at a location not occupied by waypoint.
2. Press the [TLL/GOTO] key to show the GOTO window.

```
CURSOR
POSITION
ROUTE
WAYPOINT
```

GOTO window

3. Rotate the [ENTER] knob to choose WAYPOINT and then push the [ENTER] knob.

   The SELECT NAME window appears.

```
SELECT NAME
0 0 0 1 WP
```

SELECT NAME window (for waypoints)

4. Enter the waypoint name you want to set as destination.
5. Press the SAVE soft key.

Selecting waypoint through WAYPOINT LIST

1. Press the [MENU] key to show the menu bar.
2. Rotate the [ENTER] knob to choose PLOTTER and then push the [ENTER] knob.
3. Rotate the [ENTER] knob to choose WAYPOINTS and then push the [ENTER] knob to show the WAYPOINT LIST.
4. Press the cursor pad (▲ ▼) to choose the waypoint which you want to set as destination.
5. Press the [TLL/GOTO] key.

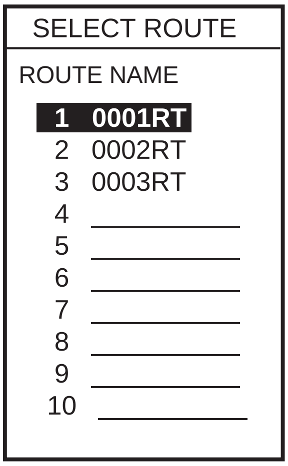
6.3 Following a Route

You can follow a route as follows.

Setting a complete route as destination

This method enables you to navigate from the first waypoint of a route.

1. Press the cursor pad to place the cursor at the location not occupied by waypoint.
2. Press the [TLL/GOTO] key to show the GO TO window.
3. Rotate the [ENTER] knob to choose ROUTE and then push the [ENTER] knob to show the SELECT ROUTE window.



Select route window

4. Rotate the [ENTER] knob to choose a route which you want to set as destination.
5. Push the [ENTER] knob.

Setting part of a route as destination

You can start the route navigation from any waypoint in a route.

1. Open the route list.
2. Press the cursor pad (▲ ▼) to choose the route desired.
3. Rotate the [ENTER] knob to choose PLOT at the bottom of the screen, and then push the [ENTER] knob.

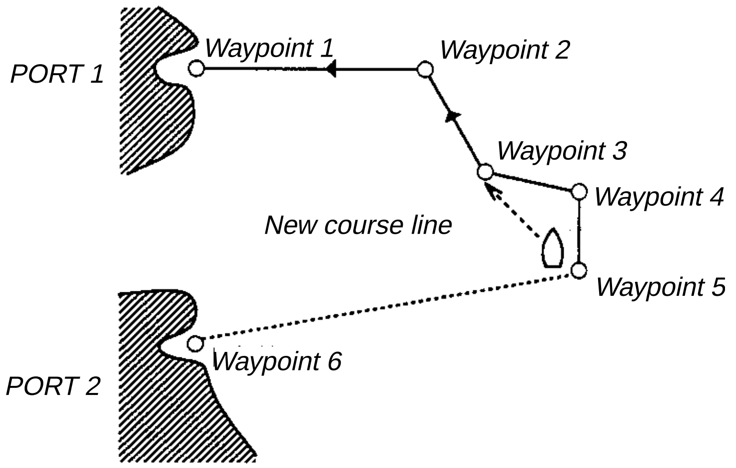
   The plotter display appears.
4. Press the cursor pad to place the cursor on any waypoint which is part of the route you want to set as destination.
5. Press the [TLL/GOTO] key.

   A line runs between destination selected and own ship's position. Also, range and bearing from own ship's position to destination appear in the data window.

   You can change the destination in the route by pressing the PREV or NEXT soft key.

Skipping route waypoints

In some instances you may want to "skip" waypoints while following a route. In the figure below, for example, the vessel has decided to navigate from waypoint 05 to 03, skipping waypoint 04.



1. Press the cursor pad to place the cursor on a waypoint which is part of the route.
2. Press the ROUTE LIST soft key to show the route list.
3. Press the cursor pad to choose a route.
4. Rotate the [ENTER] knob to choose EDIT at the bottom of screen and then push the [ENTER] knob.

   The route menu appears.
5. Press the cursor pad (▲ ▼) to choose the waypoint you want to skip.
6. Press the SKIP soft key.
7. Press the SAVE soft key to close the route menu.
8. Press the [CLEAR] key to close the route list.

6.4 Cancelling Navigation

1. Press the [TLL/GOTO] key.

   The confirmation window appears.

WARNING
Destination is already present.
STOP START

2. Confirm that "STOP" is selected, and then push the [ENTER] knob.

   The navigation is cancelled.

6.5 Affecting the Destination Set at Primary Unit to Secondary

When multiple GP-7000 series plotters are connected, the C-LINK feature may be activated to duplicate at the secondary plotter the destination set at the primary plotter. With C-LINK not turned Off, destination may also only be set at the primary plotter.

As for secondary units, a "mirror chart card" which mirrors the same area data in the C-MAP MAX chart card in the primary unit, is available. This economical card can be obtained from your dealer.

1. Press the [MENU] key to show the menu bar.
2. Rotate the [ENTER] knob to choose ADVANCED from the menu bar and then push the [ENTER] knob.
3. Rotate the [ENTER] knob to choose INPUT/OUTPUT and then push the [ENTER] knob.
4. Rotate the [ENTER] knob to choose C-LINK and then push the [ENTER] knob.

   Secondary Station
   Primary Station
   Off

5. Choose Secondary Station, Primary Station or Off as appropriate and then push the [ENTER] knob.

   Secondary Station: This unit is designated as the secondary plotter. Destination cannot be set or changed from the secondary plotter.

   Primary Station: This unit is designated as the primary plotter.

   Off: C-link feature is turned off.

   When multiple units are installed, designate only one unit as the primary plotter. All other units should be designated as secondary stations.
6. Press the [MENU] key to close the menu.

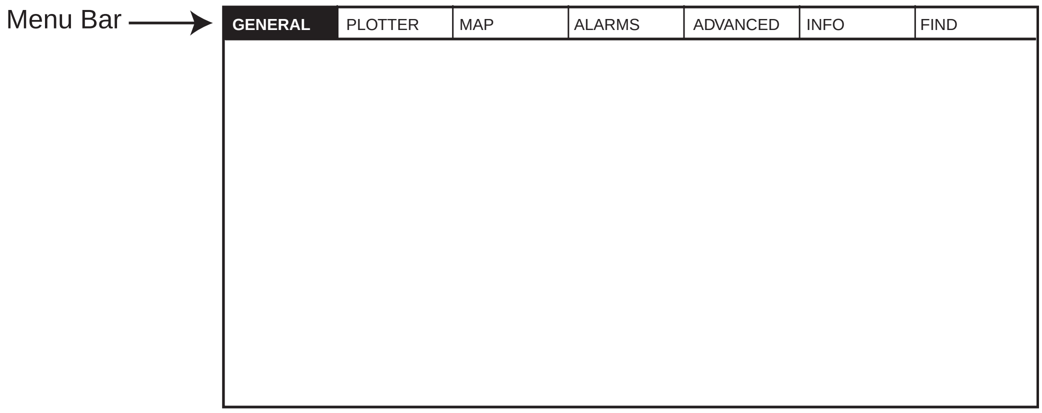
Note: If two or more GP-7000 series plotters are set as primary, the message "Both chart plotters are set as Primary station." appears with audible alarm.

7. ALARMS

The plotter section has seven conditions which generate both audio and visual alarms: arrival, XTE, temperature, depth, anchor, STW and grounding alarms. When an alarm is violated both audio and visual alarms are released. You may silence the audio alarm with the [CLEAR] key. The visual alarm remains on the screen until the offending alarm is deactivated or the reason for the alarm has disappeared.

You may set up the alarms on the ALARM menu.

1. Press the [MENU] key to show the menu bar.



Menu bar

2. Rotate the [ENTER] knob to choose ALARMS and then push the [ENTER] knob to show the ALARMS menu.

AUDIBLE ALARM	**Off**
ARRIVAL ALARM	Off
XTE ALARM	Off
TEMPERATURE ALARM	Off
DEPTH ALARM	Off
ANCHOR ALARM	Off
STW ALARM	Off
GROUNDING ALARM	Off
GROUNDING ALARM RANGE	0.25 nm
GROUNDING ALARM REPORT	
FISH ALARM	Off
FISH ALARM (B/L)	Off

Alarms menu

7.1 Audible Alarm On/Off

Audio and visual alarms are released whenever an alarm setting is violated. You can enable or disable the audio alarm as follows:

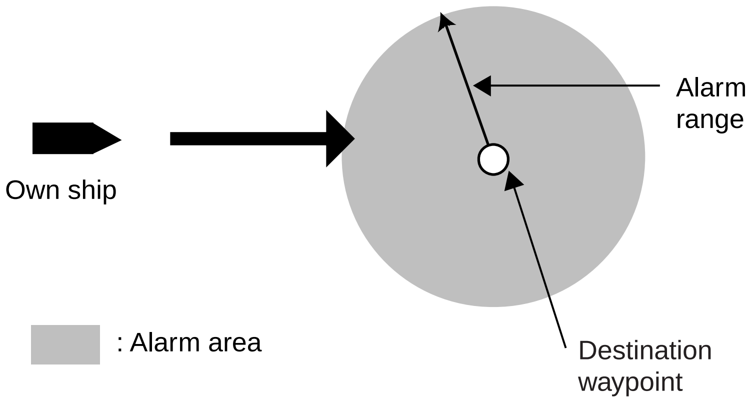
1. Press the [MENU] key to show the menu bar.
2. Rotate the [ENTER] knob to choose ALARMS and then push the [ENTER] knob to show the ALARMS menu.
3. Rotate the [ENTER] knob to choose AUDIBLE ALARM and then push the [ENTER] knob.

Internal
Internal+External
Off

4. Rotate the [ENTER] knob to choose Internal, Internal + External or Off as appropriate.
5. Push the [ENTER] knob.
6. Press the [MENU] key to close the menu.

7.2 Arrival Alarm

The arrival alarm informs you that your boat is approaching a destination waypoint. The area that defines an arrival zone is that of an imaginary circle which you approach from the outside of it. The alarm will be released if your boat enters the imaginary circle. Note that this alarm is available only when a destination is set.



How the arrival alarm works

1. Open the ALARMS menu.
2. Rotate the [ENTER] knob to choose ARRIVAL ALARM and then push the [ENTER] knob.

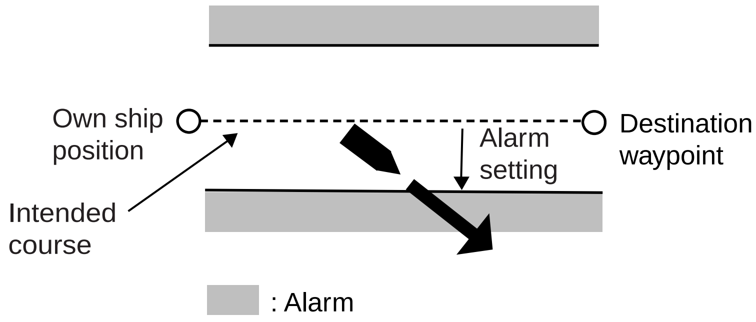
Off
0.00 nm

3. Rotate the [ENTER] knob to choose the "x.xx (value) nm" and then push the [ENTER] knob.
4. Use the cursor pad to choose digit and rotate the [ENTER] knob to enter value.
5. Press the SAVE soft key and [MENU] key in order to close the menu.

7.3 XTE (Cross-Track Error) Alarm

The XTE alarm warns you when your boat is off its intended course.

Note that this alarm is available only when a destination is set.



How to XTE alarm works

1. Open the ALARMS menu.
2. Rotate the [ENTER] knob to choose XTE ALARM and then push the [ENTER] knob.



3. Rotate the [ENTER] knob to choose "x.xx (value) nm" and then push the [ENTER] knob.
4. Rotate the [ENTER] knob to enter value.

   To change the digit, press the cursor pad (◀ ▶).
5. Press the SAVE soft key and [MENU] key in order to close the menu.

7.4 Temperature Alarm

Note: This alarm requires water temperature data.

There are two types of water alarms: Within Range and Out of Range. The Within Range alarm sounds when the water temperature is within the range set, and the Out of Range sounds when the water temperature is higher or lower than the range set.

1. Open the ALARMS menu.
2. Rotate the [ENTER] knob to choose TEMPERATURE ALARM and then push the [ENTER] knob.

Off		
Max	+32.00	F
Min	+32.00	F

3. Confirm that the cursor is at the top line, and then push the [ENTER] knob.

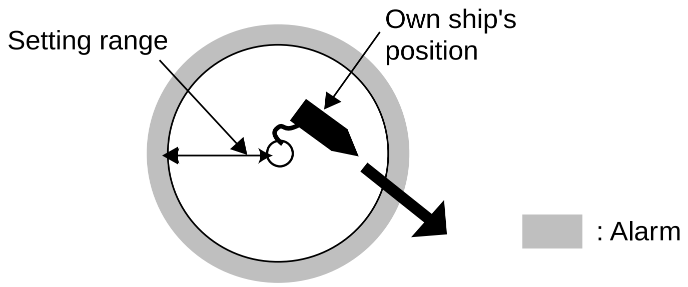
Off
Within Range
Out of Range

4. Rotate the [ENTER] knob to choose Within Range or Out of Range as appropriate and then push the [ENTER] knob.
5. Rotate the [ENTER] knob to choose Max and then push the [ENTER] knob.
6. Enter the value for the maximum temperature and then press the SAVE soft key.
7. Rotate the [ENTER] knob to choose Min, and then push the [ENTER] knob.
8. Enter the value for Min.

   For Min, you can switch between plus and minus by rotating the [ENTER] knob.
9. Press the SAVE soft key and [MENU] key in order to close the menu.

7.5 Anchor Alarm

The anchor alarm informs you that your boat is moving when it should be at rest.



How the anchor watch alarm works

1. Open the ALARMS menu.
2. Rotate the [ENTER] knob to choose ANCHOR ALARM and the push the [ENTER] knob.

Off
0.00 nm

3. Rotate the [ENTER] knob to choose "x.xx (value) nm" and then push the [ENTER] knob.
4. Rotate the [ENTER] knob to enter value.
5. Push the SAVE soft key and [MENU] key in order to close the menu.

7.6 STW Alarm

The STW alarm warns you when your boat's speed is over the speed range set.

1. Open the ALARMS menu.
2. Rotate the [ENTER] knob to choose STW ALARMS and then push the [ENTER] knob.

Off
Max +000.0 kt
Min +000.0 kt

3. Confirm that the cursor is located at the top line and then push the [ENTER] knob.
4. Rotate the [ENTER] knob to choose On and then push the [ENTER] knob.
5. Rotate the [ENTER] knob to choose Max, and then push the [ENTER] knob.
6. Rotate the [ENTER] knob to enter the value, and then press the SAVE soft key.
7. Rotate the [ENTER] knob to choose Min, and then push the [ENTER] knob.
8. Enter the value for Min, similar to how you did for Max.
9. Press the SAVE soft key and [MENU] key in order to close the menu.

7.7 Depth Alarm

The depth alarm sounds when the depth is within the alarm range set.

1. Open the ALARMS menu.
2. Rotate the [ENTER] knob to choose DEPTH ALARM and then push the [ENTER] knob.

Off	
Depth	0000.0 Ft
Range	0010.0 Ft

3. Confirm that the cursor is located at the top line, and then push the [ENTER] knob.

Off
On

4. Rotate the [ENTER] knob to choose On and then push the [ENTER] knob.
5. Rotate the [ENTER] knob to choose Depth and then push the [ENTER] knob.
6. Enter the starting point of range and then press the SAVE soft key.
7. Rotate the [ENTER] knob to choose Range and then push the [ENTER] knob.
8. Enter the alarm range, and then press the SAVE soft key.
9. Press the [MENU] key to close the menu.

7.8 Grounding Alarm

The grounding alarm sounds when there is an object on chart data which is within the range and depth set. Further, you can know what kind of object is causing the alarm when it enters in the range.

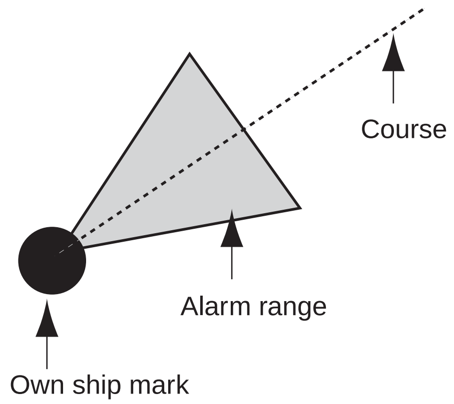
1. Open the ALARMS menu.
2. Rotate the [ENTER] knob to choose GROUNDING ALARM and then push the [ENTER] knob.
3. Rotate the [ENTER] knob to choose "xx (value) ft" and then push the [ENTER] knob.
4. Enter the depth value desired.
5. Press the SAVE soft key.
6. Press the [CLEAR] key.
7. Rotate the [ENTER] knob to choose GROUNDING ALARM RANGE and then push the [ENTER] knob.

0.25 nm
0.5 nm
1.0 nm

8. Rotate the [ENTER] knob to choose the range and then push the [ENTER] knob.
9. Push the [MENU] key in order to close the menu.

A triangle appears next to own ship mark to show the alarm range.

When the grounding alarm warns, you can know what kind of object has entered the setting range and depth by choosing GROUNDING ALARM REPORT from the ALARMS menu.



This page is intentionally left blank.

8. CUSTOMIZING YOUR UNIT

This chapter describes the various options which allow you to customize the plotter section to suit your needs.

8.1 GENERAL Menu

The GENERAL menu provides the basic setup for the unit.

LANGUAGE	**English**
KEYPAD BEEP	Off
PALETTE	Normal
TIME LINE	Infinite
TIME REFERENCE	UTC
TIME FORMAT	12 hour
DATE FORMAT	MM-DD-YY
AUTO INFO	On Points
SHIP ICON	
SHIP OFFSET	
WIND GRAPH	
UNITS OF MEASURE	

General menu

LANGUAGE

You can choose the language to display from among English, Italian, French, German, Spanish, Norwegian, Swedish, Russian, Finnish and Danish.

KEYPAD BEEP

Turns key beep on/off.

PALETTE

The display hue can be matched to the current lighting condition from among Sun-Light, Night, Normal and NOAA (NOAA-like colors).

TIME LINE

Choose the interval for the time line (own ship's vector) from among 2 min, 10 min, 30 min, 1 hour, 2 hours and Infinite. The length of the bar shows distance your ship will move within selected time. Also the line can be erased by selecting Off.

TIME REFERENCE

GPS uses UTC time. If you would rather use local time, key in the time difference between it and UTC time. Rotate the [ENTER] knob to change the digits and "+" "-".

TIME FORMAT

Chooses time notation; 12 hours or 24 hours.

DATE FORMAT

Chooses date notation; MM-DD-YY or DD-MM-YY.

AUTO INFO

Chooses what data is available with the cursor; Off, On Points or On All.

On Points: Data for selected chart symbol, for example, lighthouse or harbor.

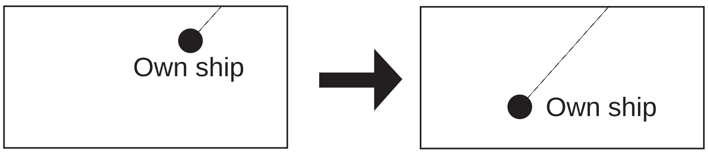
All Points: Data for any location within the area covered by the chart.

SHIP ICON

Chooses the shape of own ship marker; ●, ⊕ or ▲.

SHIP OFFSET

The display can be shifted automatically to the appropriate direction when own ship reaches an edge of screen. This function is useful to overlook the forward without manual cursor operation. Choose On to enable the SHIP OFFSET. Note that this function is not available when the cursor is turned on.



When own ship reaches an edge of screen...

The display is shifted to show the forward direction.

WIND GRAPH

See section 2.10 for details about the wind display.

UNITS OF MEASURE

Chooses unit of measurement for distance, speed, depth, altitude and temperature.

Distance: nm, sm, km, nm + ft, nm + m, sm + ft
(For "+ft" and "+m, " it is used in the near range.)

Speed: Kt, mph, km/h

Depth: ft, fa, m, pb (P/B)

Altitude: ft, fl, m

Temperature: °C, °F

8.2 MAP Menu

The MAP menu sets up the map display.

ZOOM TYPE	Standard
FONTS SYMBOLS	NORMAL
PERSPECTIVE VIEW	Off
DYNAMIC NAV-AIDS	Off
MIXING LEVELS	On
SAFETY STATUS BAR	Off
NAV AIDS PRESENTATION	US
CURRENTS PREDICTION	
MAP CONFIGURATIONS	

Map menu

ZOOM TYPE

Chooses the zoom type between Standard and Flexi-Zoom.

Standard: Normal zoom function

Flexi-Zoom: Shows the scale indication.

FONTS & SYMBOLS

Chooses the size of landmarks and their names, between NORMAL and LARGE.

PERSPECTIVE VIEW

Chart data is projected in perspective mode, for 3D simulation, during navigation.

DYNAMIC NAV-AIDS

Shows the flash from the lighthouse/buoy with the actual interval.

MIXING LEVELS

Detailed chart data and coarse chart data may be incorporated and displayed in areas where they are mixed. With detailed chart data displayed and own ship position or cursor position as reference, coarse chart data area of low accuracy is shown in white when this setting is disabled. When enabled, coarse chart data is shown in the same scale as detailed chart data and its location is marked with a dots.

SAFETY STATUS BAR

When this item is turned On, the following menu bar appears at the top of screen.

NORMAL	BEST MAP	DATA OFF	DECLUT.	DANGERS	CAUTIONS

NORMAL (or U.ZOOM or O.ZOOM)

This indication appears to help you select a suitable chart scale.

NORMAL: Suitable chart scale is selected.

U.ZOOM: Chart scale is too small.

O.ZOOM: Chart scale is too large.

BEST MAP

Shown in red when the unsuitable chart scale is selected.

DATA OFF

Mixing levels can be turned on when the electronics chart coverage area does not provide enough coverage to completely fill the display screen.

When the cursor or own ship mark is placed in the area with coverage, the chart data is shown as below.

On: The chart line in the area with no coverage is shown. This area is filled with dots.

Off: The area with no coverage is not shown (goes to white).

DECLUT.

For C-MAP MAX charts, symbols of low priority (ex. map symbols on land) can be automatically hidden to unclutter the screen when you change the scale. When the function is turned on, DECLUT. appears in red.

DANGERS

Shown in red when the GROUNDING alarm detects the high-risk object (listed in the grounding report) when the GROUNDING alarm is turned on.

CAUTIONS

Shown in red when the GROUNDING alarm detects the low-risk object when the GROUNDING alarm is turned on.

NAV AIDS PRESENTATION

Chooses what kind of navaids symbols to display, International or US.

CURRENTS PREDICTION

Displays the current prediction window, which shows the direction and speed of the current at the place of current symbol (arrow shaped) selected with cursor.

CURRENTS PREDICTION	
Apr/25/05	10:05:26AM
DIR - - -T	SPD -.- -kt

Current prediction window

This window can show the past and future current data in by pressing INCR. TIME or DECR. TIME soft key. Each press of those keys shows the past (or future) current data in 30 minutes intervals. Current data for the desired date and time is also available by using the SET TIME soft key Note that current symbols change their shapes and orientations to show the current direction depending on the time set in the window when the cursor is not placed on the current mark. (DIR and SPD data in the window are blank.)

To erase the current prediction window, press the EXIT soft key.

MAP CONFIGURATION

DISPLAY MODE

Chooses the map to display; Full, Medium, Low, Tides or Custom.
"Full" shows all data in the chart card. Note that data can be arranged only when Custom is chosen here. As for each items, refer to the handbook for C-MAP.

Settings of Display modes

Partition	Items	Display mode			
		Full	Medium	Low	Tides
MARINE SETTINGS	NAMES	On	On	On	On
	NAME TAGS	On	Off	Off	Off
	NAV AIDS & LIGHT SECTOR	On	No Sector	No Sector	Off
	ATTENTION AREAS	On	On	Off	Off
	TIDES & CURRENTS	On	Off	Off	On
	SEABED TYPE	On	Off	Off	Off
	PORTS & SERVICES	On	On	Off	Off
	TRACK & ROUTES	On	Off	Off	Off
UNDERWATER OBJECTS SETTINGS	UNDERWATER OBJECTS LIMT	1000 ft	33 ft		
		166 fa	5 fa		
		304 m	10 m		
		184 pb	6 pb		
	ROCKS	Icon+ Depth	Icon	Icon	Icon
	OBSTRUCTIONS	Icon+ Depth	Icon	Icon	Icon
	DIFFUSERS	Icon+ Depth	Icon	Icon	Icon
	WRECKS	Icon+ Depth	Icon	Icon	Icon
DEPTH SETTINGS	DEPTH RANGE MIN	0 ft			
		0 fa			
		0 m			
		0 pb			
	DEPTH RANGE MAX	32805 ft			
		5467 fa			
		9999 m			
		6060 pb			

Settings of Display modes (con't)

Partition	Items	Display mode			
		Full	Medium	Low	Tides
LAND SETTINGS	LAND ELEVATIONS	On	On	Off	Off
	LAND ELEVATION VALUES	On	Off	Off	Off
	ROADS	On	Off	Off	Off
	POINTS OF INTEREST	On	Off	Off	Off
CHART SETTINGS	LAT/LON GRID	On	Off	Off	Off
	CHART BOUNDARIES	On	Auto	Off	Off
	VALUE ADDED DATA	On	Off	Off	Off
	CHART LOCK	On	On	On	On

Setting details

Menu	Item	Settings
MARINE SETTINGS	NAMES	On, Off
	NAME TAGS	On, Off
	NAV AIDS & LIGHT SECTORS	On, Off, No Sector
	ATTENTION AREAS	On, Off
	TIDES & CURRENTS	On, Off
	SEABED TYPE	On, Off
	PORTS & SERVICES	On, Off
	TRACKS & ROUTES	On, Off
UNDERWATER OBJECTS SETTINGS	UNDERWATER OBJECTS LIMIT	0-1000 ft
		0-166 fa
		0-304 m
		0-184 pb
	ROCKS	Off, Icon, Icon+Depth
	OBSTRUCTIONS	Off, Icon, Icon+Depth
	DIFFURS	Off, Icon, Icon+Depth
	WRECKS	Off, Icon, Icon+Depth

(con't)

Menu	Item	Settings
DEPTH SETTINGS	DEPTH RANGE MIN	07, 16, 33 ft
		01, 03, 06 fa
		02, 05, 10 m
		01, 03, 06 pb
	DEPTH RANGE MAX	16, 33, 66 ft
		03, 06, 11 fa
		05, 10, 20 m
		03, 06, 12pb
LAND SETTINGS	LAND ELEVATIONS	On, Off
	LAND ELEVATION VALUES	On, Off
	ROADS	On, Off
	POINTS OF INTEREST	On, Off
CHART SETTINGS	LAT/LON GRID	On, Off
	CHART BOUNDARIES	On, Off, Auto
	VALUE-ADDED DATA	On, Off
	CHART LOCK	On, Off

8.3 ADVANCED Menu

The ADVANCED menu calibrates data.

FIX

Item	Settings
FIX CORRECTION	GPS-generated position may be off by some seconds because of various factors. In this case, you can automatically correct GPS position by selecting On.
COMPUTE CORRECTION	Corrects the GPS antenna position. After placing the cursor at the own ship's true position, select this item.
CORRECTION OFFSET	Corrects the GPS antenna position manually. Enter the longitude and latitude numeric data of own ship's true position.
POSITION FILTER	When the DOP or receiving condition is unfavorable, the GPS fix may change, even if the vessel is dead in water. This change can be reduced by smoothing the raw GPS fixes. You can choose the setting from among Off, Low, Medium and High. The higher the setting, the more smoothed the raw data, however too high a setting slows response time to change in latitude and longitude. This is especially noticeable at high ship's speeds. Off is normal setting; increase the setting if the GPS fix changes.
SPEED FILTER	During position fixing, ship's velocity (speed) is directly measured by receiving GPS satellite signals. The raw velocity data may change randomly depending on receiving conditions and other factors. You can reduce this random variation by increasing the filter setting. Like with latitude and longitude filter, the higher the speed filter the more smoothed the raw data. If the setting is too high, however, the response to speed and course change slows. For no smoothing, choose Off. (Off, Low, Medium, High)

NAVIGATE

Item	Settings
COORDINATE SYSTEM	Choose the coordinate display method among ddd mm ss, ddd mm.mm, ddd mm.mmm and ddd.ddddd for latitude, or TD.
MAP DATUM	Geodetic datum is a reference for geodetic survey measurements consisting of fixed latitude, longitude and azimuth values associated with a defined station of reference. You must have the correct geodetic datum selected in your plotter so that it will reference the correct point on the chart for a given latitude and longitude. Although WGS-84 is now the world standard, other categories of charts still exist.
MAP ORIENTATION	North Up, Course Up, Auto Course Up
MAP ORIENTATION RES	Sets the degree to re-draw the course on Auto course-up mode. (Setting range: 5° to 60°)

COMPASS

Item	Settings
BEARINGS	Choose how to calculate bearing, Mag or True. True bearing is a bearing measured using true North as the reference direction, and it is calculated by the formula True Bearing = Magnetic Bearing - Magnetic Variation. Magnetic bearings are measured with magnetic north as the reference direction. Select Mag when using a magnetic compass, True when using a gyrocompass.
VARIATION	The location of the magnetic north pole is different from the geographical north pole. This causes a difference between the true and magnetic north location. This difference is called magnetic variation, and varies with respect to the observation point on earth. Your unit is preprogrammed with all the earth's magnetic variations. However, you may wish to enter variation manually to refine accuracy by entering the magnetic variation referring to a nautical chart.
CALIBRATION	Enters eight directions (N, N/E, E, S/E, S, S/W, W, N/W) deviation values for magnetic compass.

C-MAP WEATHER SERVICE

This function provides weather information. For further details, please ask your dealer.

8.4 INFO Menu

This menu shows the detailed information for the location selected by the cursor. Choose a location, and then open the INFO menu and select item.

8.5 FIND Menu

You can find objects on the chart data in use dividing with the category of TIDE STATION, WRECKS and OBSTRUCTIONS.

Choose the appropriate category from the FIND menu, and then push the [ENTER] knob.

9. DATA TRANSFER

This chapter provides information for saving and replaying data to and from memory cards, and uploading and downloading data.

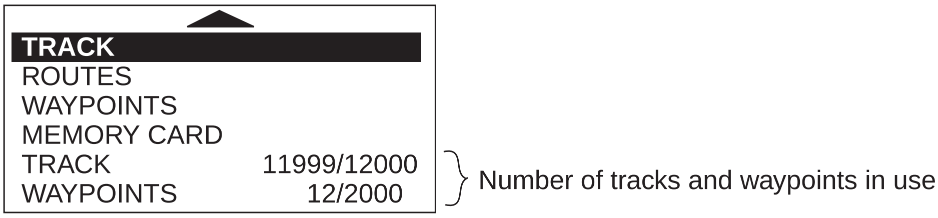
9.1 Memory Card Operations

The memory cards store these data: waypoints, routes and track.

9.1.1 Selecting the card slot to use

There are two card slots, upper and lower. Choose the one to use for memory cards as follows:

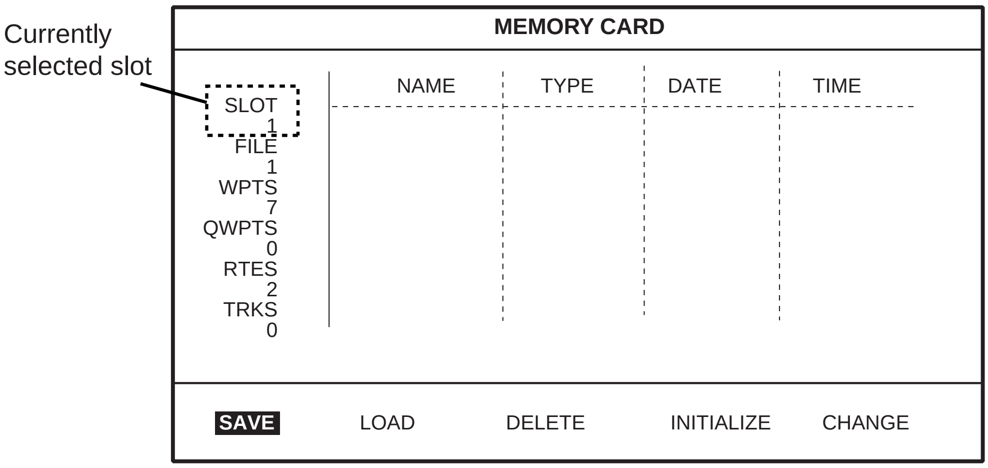
1. Press the [MENU] key to show the menu bar.
2. Rotate the [ENTER] knob to choose PLOTTER and then push the [ENTER] knob.



Plotter menu

3. Rotate the [ENTER] knob to choose MEMORY CARD and then push the [ENTER] knob.

   The MEMORY CARD list appears.



Memory card list

4. Rotate the [ENTER] knob to choose CHANGE at the bottom of screen and then push the [ENTER] knob to change the active slot.

   The currently selected slot is shown at the left-hand top corner.

   SLOT 1: Upper slot

   SLOT 2: Lower slot

9.1.2 Formatting memory cards

Before you can use a memory card it must be formatted. This prepares the card for use with the system. Note that formatting a memory card erases all data from the card.

1. Insert the memory card to the selected slot.
2. Open the MEMORY CARD LIST.
3. Rotate the [ENTER] knob to choose INITIALIZE at the bottom of screen and then push the [ENTER] knob.

WARNING
Initialize Memory Card. All data will be lost. Are you sure? **YES** NO

4. Push the [ENTER] knob to format the card.

Note: If the memory card was not inserted correctly, the message "FILE NOT FOUND." appears.

9.1.3 Saving data to a memory card

1. Insert a formatted memory card into the selected slot.
2. Press the [MENU] key to show the menu bar.
3. Rotate the [ENTER] knob to choose PLOTTER and then push the [ENTER] knob to show the PLOTTER menu.
4. Rotate the [ENTER] knob to choose MEMORY CARD and then push the [ENTER] knob to show the MEMORY CARD list.
5. Rotate the [ENTER] knob to choose SAVE and then push the [ENTER] knob.

SAVE FILE	
NAME	**FILE01**
TYPE	WPTS

6. Press the [ENTER] knob, and then enter the file name for which you want to save the data under.
7. Press the [SAVE] soft key.
8. Rotate the [ENTER] knob to choose TYPE, and then push the [ENTER] knob.

WPTS
TRACK
ROUTE

9. Rotate the [ENTER] knob to choose WPTS (waypoints), TRACK or ROUTE as appropriate.
10. Push the [ENTER] knob followed by SAVE soft key.
11. For TRACK, rotate the [ENTR] knob to choose the number for track, and then press the SAVE soft key.

9.1.4 Playing back data from a memory card

Data (track, waypoints, routes) can be loaded from a memory card and displayed on the screen. This feature is useful for observing past data.

1. Insert the memory card to play back into the selected slot.
2. Open the MEMORY CARD list.
3. Rotate the [ENTER] knob to choose LOAD and then push the [ENTER] knob.

9.2 Sending/Receiving Data

You can send/receive waypoints and routes from/to a PC or another GP-7000/F to the internal memory, through the NMEA1, NMEA 2 or RS-232C port at the rear of the display unit.

9.2.1 Sending/receiving waypoints data

You may send/receive all waypoints data as follows. When sending data, set the connected equipment for receiving.

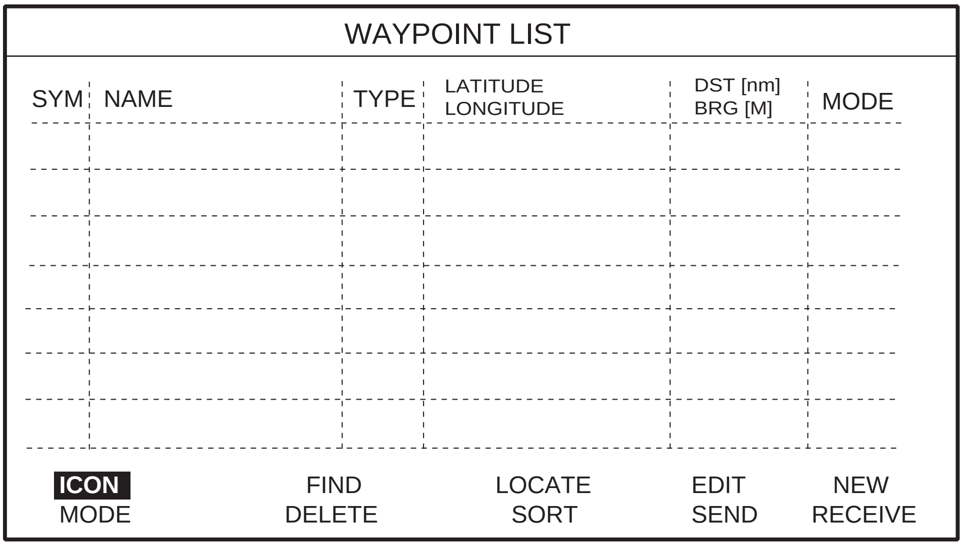
1. Connect the PC or another GP-7000/F to the equipment.
2. Choose INPUT/OUTPUT from the ADVANCED menu.
3. When sending data, follow steps shown below.
   1) Choose NMEA 1 OUTPUT, NMEA 2 OUTPUT or RS232 3 OUTPUT appropriately.
      The sentence window appears.

GLL	On	WPL	On
VTG	On	RTE	On
BWR	Off	TLL Out	On
DBT	Off		
DPT	Off		
MTW	Off		
VHW	Off		
WCV	Off		
APA	Off		
APB	On		
HDG	Off		
BOD	Off		
XTE	Off		
RMA	Off		
RMB	On		
RMC	On		
GGA	Off		
HSC	Off		
AAM	Off		
GTD	Off		
MWV	Off		
ZDA	Off		

Sentences window

   2) Choose WPL and then set it on.
      Note: When receiving the waypoint data on PC, set all sentences other than WPL off.

4. When receiving data, follow steps shown below.
   1) Choose NMEA 1 INPUT, NMEA 2 INPUT or RS232 3 INPUT appropriately, and then push the [ENTER] knob.
   2) Communication format between this unit and PC (or GP-7000/F) should be the same.
5. Press the [CLEAR] key several times to close the window and menus.
6. Open the WAYPOINT LISTS.



Waypoint list

7. Rotate the [ENTER] knob to choose SEND or RECEIVE at the bottom of the screen.

   SEND: Sending all waypoints in the internal memory to external equipment.

   RECEIVE: Receiving all waypoints to the internal memory from external equipment.
8. Press the [ENTER] knob to execute.

   When the sending is completed, the message "User Points sending." appears.
9. For receiving, do the operation for sending on the PC (or GP-7000/F).

   When the receiving is completed, the message "Receiving completed" appears.

9.2.2 Sending/receiving routes data

You may sending/receiving routes as follows. When sending data, set the connected equipment for receiving.

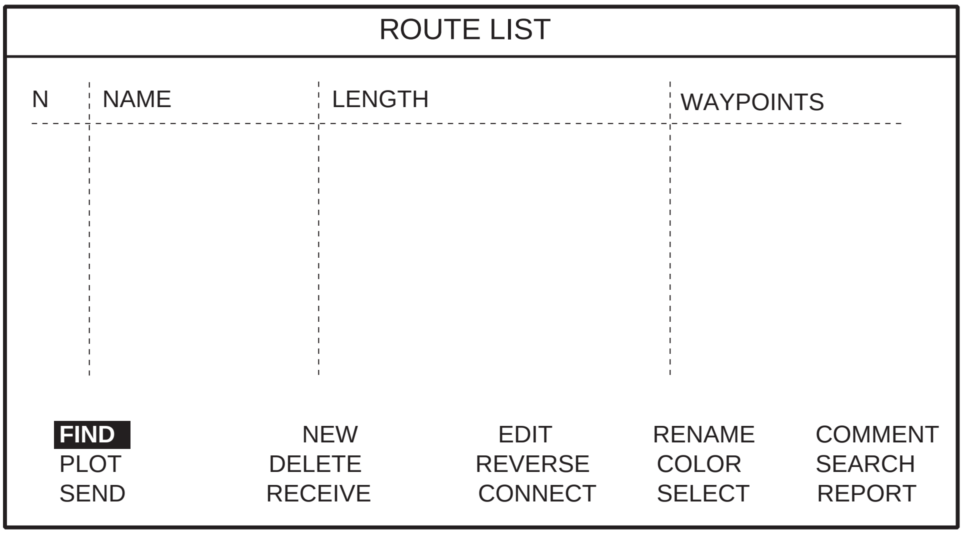
Note: All waypoints in a route can be transported with the route.

1. Connect the PC or another GP-7000/F to the equipment.
2. Choose INPUT/OUTPUT from the ADVANCED menu.
3. When sending data, follow steps shown below.
   1) Choose NMEA 1 OUTPUT, NMEA 2 OUTPUT or RS232 3 OUTPUT appropriately.
      The sentence window appears.

GLL	**On**	WPL	On
VTG	On	RTE	On
BWR	Off	TLL Out	On
DBT	Off		
DPT	Off		
MTW	Off		
VHW	Off		
WCV	Off		
APA	Off		
APB	On		
HDG	Off		
BOD	Off		
XTE	Off		
RMA	Off		
RMB	On		
RMC	On		
GGA	Off		
HSC	Off		
AAM	Off		
GTD	Off		
MWV	Off		
ZDA	Off		

Sentences window

   2) Choose WPL and RTE sentences and then set these on.
4. When receiving data, follow steps shown below.
   1) Choose NMEA 1 INPUT, NMEA 2 INPUT or RS232 3 INPUT appropriately, and then push the [ENTER] knob.
   2) Communication format between this unit and PC (or GP-7000/F) should be the same.
5. Press the [CLEAR] key several times to close the window and menus.
6. Open the ROUTE LIST.



Route list

7. For sending, press the cursor pad (▲ ▼) to choose the route desired.
8. Rotate the [ENTER] knob to choose SEND or RECEIVE at the bottom of the screen.

   SEND: Sending the route chosen at step 8 to external equipment.

   RECEIVE: Receiving all routes to the internal memory from external equipment.
9. Press the [ENTER] knob to execute.

   When the sending is completed, the message "User Points sending." appears.
10. For receiving, do the operation for sending on the PC (or GP-7000/F).

    When the receiving is completed, he message "Receiving completed" appears.

9.3 Waypoint, Route Format

You may transfer waypoint and route data to another GP-7000 series unit or a PC in Standard or Furuno format, via the NMEA1 port, NMEA2 port or PC NMEA IN port.

1. Press the [MENU] key to show the menu bar.
2. Rotate the [ENTER] knob to choose ADVANCED from the menu bar and then push the [ENTER] knob.
3. Rotate the [ENTER] knob to choose INPUT/OUTPUT and then push the [ENTER] knob.
4. Rotate the [ENTER] knob to choose WPL/RTE FORMAT and then push the [ENTER] knob.

   Standard
   Furuno
5. Choose Furuno or Standard as appropriate and then push the [ENTER] knob.

   Standard: NMEA format WPL and RTE sentences are output when "SEND" is executed to transfer waypoint list or route list.

   Furuno: Waypoint and route data in Furuno original format (P sentence) are output when "SEND" is executed to transfer waypoint list or route list. Waypoint color, shape and comment data are also sent.
6. Press the [MENU] key to close the menu.

10. VIDEO SOUNDER OPERATION

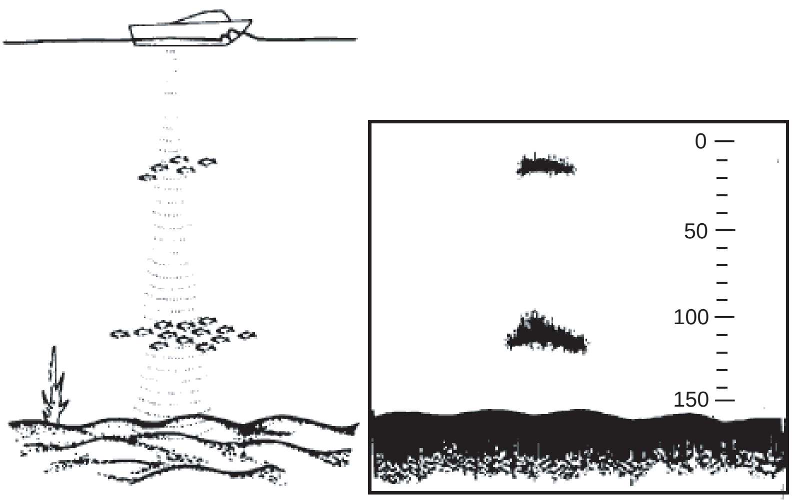
This chapter covers video sounder operation. The procedures in this chapter assume that a full screen video sounder display is selected.

Principle of Operation

The video sounder determines the distance between its transducer and underwater objects such as fish, lake bottom or seabed and displays the results on screen. It does this by utilizing the fact that an ultrasonic wave transmitted through water travels at a nearly constant speed of 4900 feet (1500 meters) per second. When a sound wave is reflected back toward the source (transducer). Thus by calculating the time difference between the transmission of a sound wave and the reception of the reflected sound wave, the depth to the object can be determined.

The entire process begins in the sounder. Transmitter power is sent to the transducer as a short pulse of electrical energy. The electrical signal produced by the transmitter is converted into an ultrasonic signal by the transducer and transmitted into the water. Any returning signals from intervening objects (such as a fish school) are received by the transducer and converted into an electrical signal. The signals are then amplified in the amplifier section, and finally, displayed on screen.

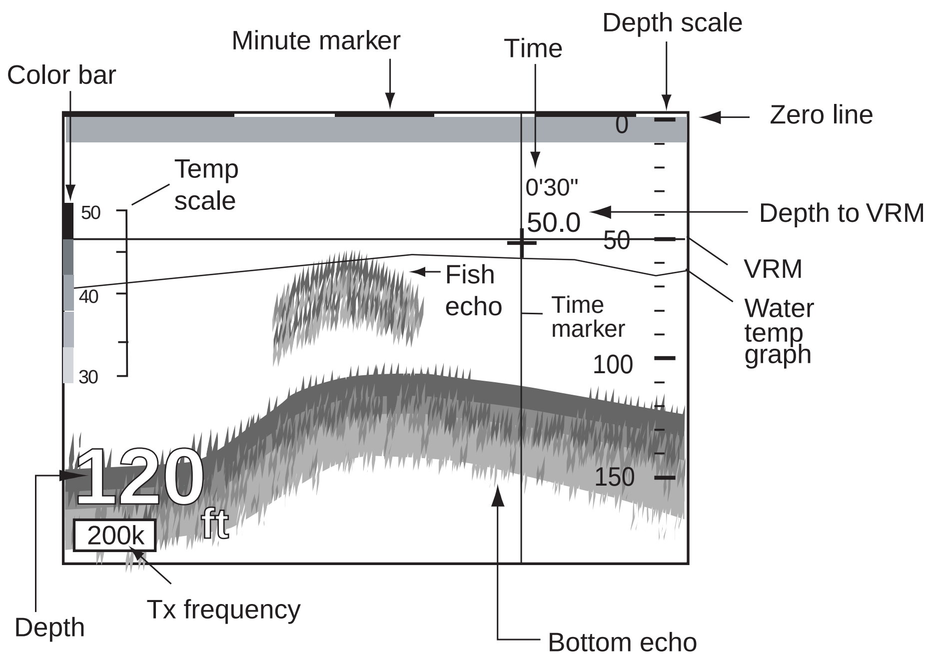
The picture displayed is made up of a series of vertical scan lines, one for each transmission. Each line represents a snapshot of what has occurred beneath the boat. A series of snapshots are accumulated side by side across the screen, and the resulting contours of the bottom and fish between the bottom and surface are displayed.



Underwater conditions and video sounder display

10.1 Sounder Display

10.1.1 Description of sounder display



Indications on the single frequency display

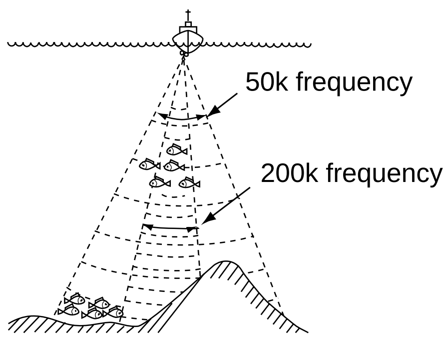
Single frequency

50 kHz picture

The sounder uses ultrasonic pulses to detect bottom conditions. The lower the frequency of the pulse, the wider the detection area. Therefore, the low frequency is useful for general detection and judging bottom condition.

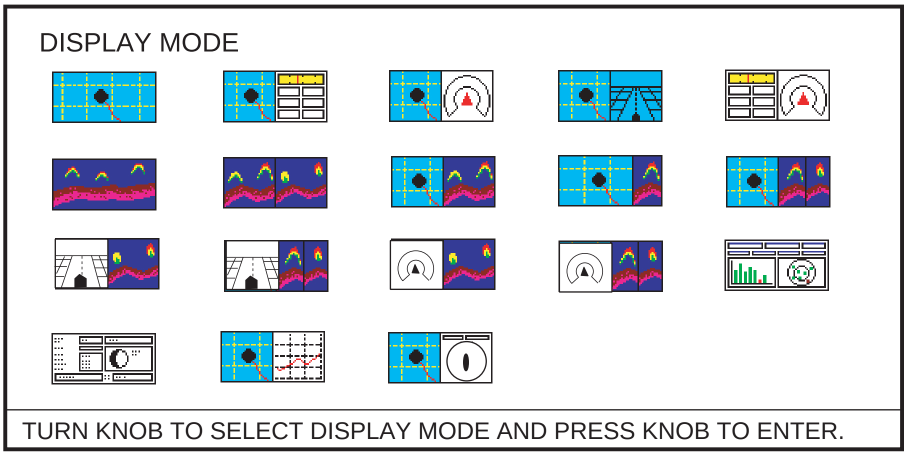
200 kHz picture

The higher the frequency of the ultrasonic pulse the better the resolution. Therefore, the high frequency is ideal for detailed observation of fish school.

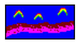


Sounding area and transmission frequency

1. Press the [DISP] key to show the DISPLAY MODE menu.



Display mode menu

2. Rotate the ENTER knob to choose the  icon.
3. Push the [ENTER] knob.

Selecting transmission frequency

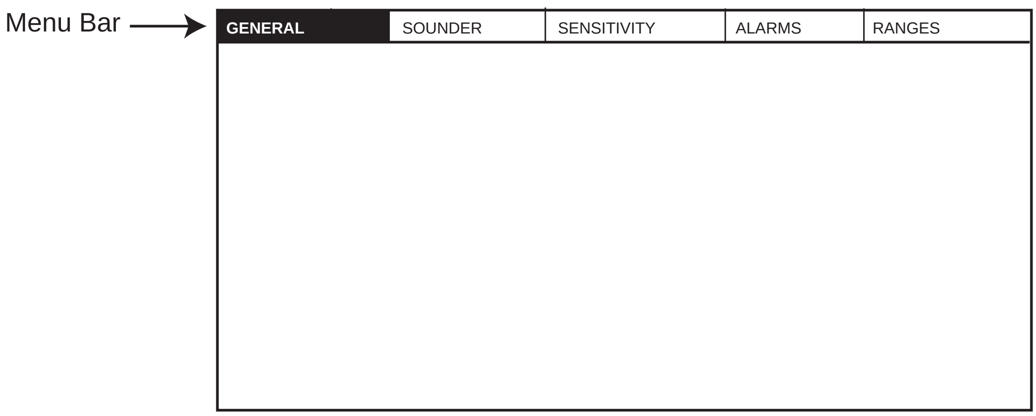
The single frequency display shows either the 50k picture or 200k picture. To select transmission frequency, do one of the following:

Using the soft key

Press the 50/200 kHz soft key to choose the frequency.

Through the menu

1. Press the [MENU] key to show the menu bar.



Menu bar

2. Rotate the [ENTER] knob to choose SOUNDER and then push the [ENTER] knob to show the SOUNDER menu.

AUTO MODE PRESET	**MANUAL**
DISPLAY MODE	NORMAL
FREQUENCY	50 KHz
PICTURE ADVANCE 1/1	
TEMPERATURE GRAPH	On
ZOOM MARKER	On
A-SCOPE	Off
SOUNDER SETUP	
SENSOR SETUP	

Sounder menu

3. Rotate the [ENTER] knob to choose FREQUENCY and then push the [ENTER] knob.

50 kHz
200 kHz

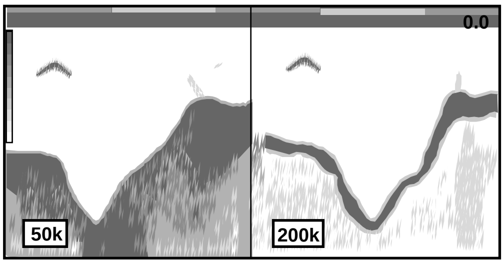
4. Select 50 KHz or 200 KHz as appropriate and then push the [ENTER] knob.
5. Press the [MENU] key to close the menu.

10.1.2 Selecting a sounder display

There are seven display modes from which to choose: dual frequency, single frequency, marker zoom, bottom zoom, bottom lock, bottom discrimination and A-scope.

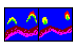
Dual frequency

The dual-frequency display provides both 50 kHz and 200 kHz pictures. This display is useful for comparing the same picture with two different sounding frequencies.



Dual-frequency display

To show the dual frequency display, do the following.

1. Press the [DISP] key.
2. Rotate the [ENTER] knob to choose  icon.
3. Push the [ENTER] knob.

Bottom lock, Bottom zoom, Marker zoom, Bottom discrimination

Using the soft key

1. Press the DISP MODE soft key to show the display mode window.

NORMAL
BOTTOM LOCK
BOTTOM ZOOM
MARKER ZOOM
BOTTOM DISCRIMINATION

Display mode window

2. Rotate the [ENTER] knob to choose the mode desired and then push the [ENTER] knob.

Through the menu

1. With a single frequency display selected, press the [MENU] key to show the menu bar.
2. Rotate the [ENTER] knob to choose SOUNDER and then push the [ENTER] knob.

AUTO MODE PRESET	**MANUAL**
DISPLAY MODE	NORMAL
FREQUENCY	50 KHz
PICTURE ADVANCE 1/1	
TEMPERATURE GRAPH	On
ZOOM MARKER	On
A-SCOPE	Off
SOUNDER SETUP	
SENSOR SETUP	

Sounder menu

3. Rotate the [ENTER] knob to choose DISPLAY MODE and then push the [ENTER] knob.

NORMAL
BOTTOM LOCK
BOTTOM ZOOM
MARKER ZOOM
BOTTOM DISCRIMINATION

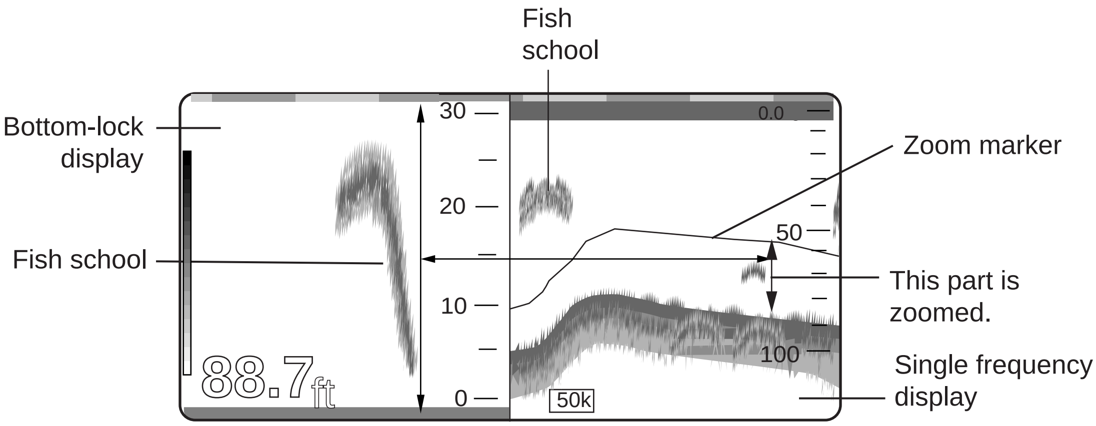
Display mode window

4. Rotate the [ENTER] knob to choose the mode desired and then push the [ENTER] knob.
5. Press the [MENU] key to close the menu.

Bottom-lock display

The bottom-lock display provides a compressed normal picture on the right half of the screen and a 15 or 30 feet (5 or 10 meter) wide layer in contact with the bottom is expanded onto the left half of the screen. This mode is useful for discriminating bottom fish from the bottom echo.

Note: The range of the bottom-lock display can be changed at BOTTOM LOCK RANGE on RANGES menu.

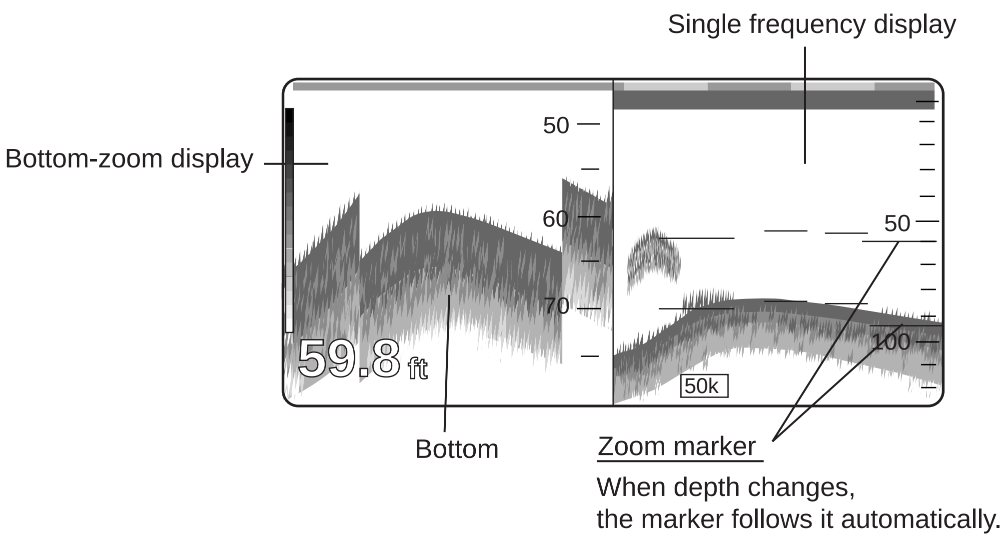


Bottom-lock display plus normal sounder display

Bottom-zoom display

The bottom-zoom display expands bottom and bottom fish echoes by the chosen zoom range and is useful for determining bottom hardness. A bottom displayed with a short echo tail usually means it is a soft, sandy bottom. A long echo tail means a hard bottom.

Note: The range of the bottom-zoom can be changed at ZOOM RANGE on RANGES menu.



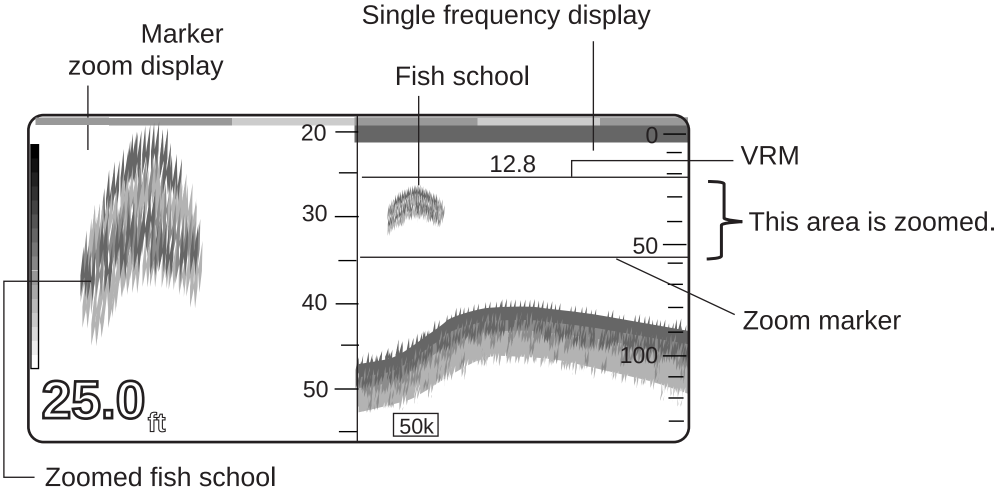
Bottom-zoom display plus normal sounder display

Marker-zoom display

The marker-zoom display expands a selected area of the normal sounder picture to full vertical size of the screen on the left-half window. You may specify the portion to expand by operating the VRM (Variable Range Marker), which you can shift with the [ENTER] knob. The area between the VRM and zoom marker is expanded.

Note 1: The VRM is set independently from other displays in case of multiple displays.

Note 2: The range of the bottom-lock can be changed at BOTTOM LOCK RANGE on RANGES menu.

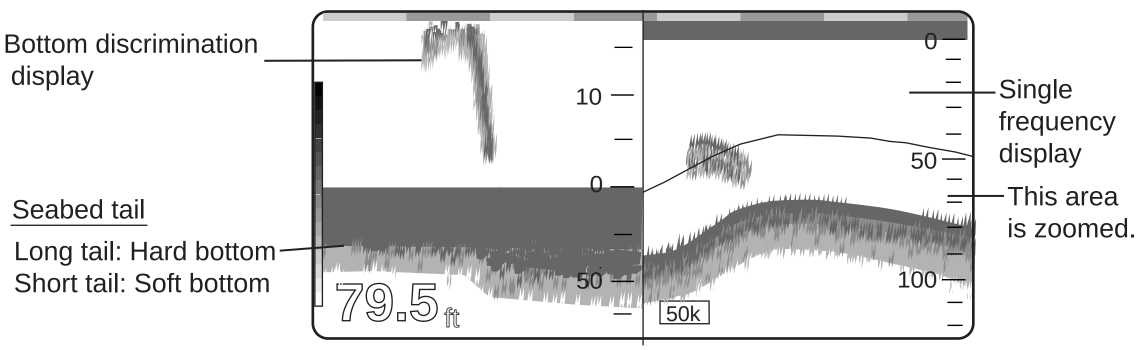


Marker-zoom display plus normal sounder display

Bottom discrimination display

The bottom discrimination mode displays the bottom echo to help you determine bottom hardness. A bottom displayed with a short echo tail usually means it is a soft, sandy bottom. A long echo tail means a hard bottom.

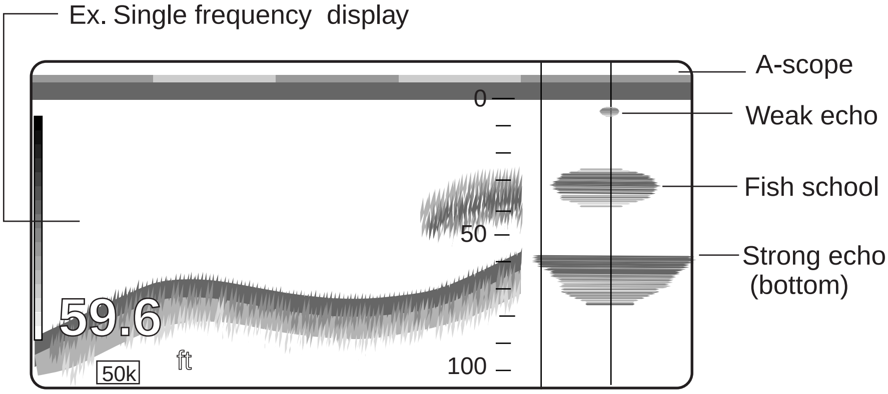
Note: The range of the bottom discrimination can be changed at BOTTOM LOCK RANGE on RANGES menu.



Bottom discrimination display

A-scope display

The A-SCOPE display, which can be enabled or disabled on the SOUNDER menu, shows echoes at each transmission with amplitudes and tone proportional to their intensities. It is useful for estimating fish specifies and seabed composition.



A-scope display

10.2 Automatic Sounder Operation

Automatic sounder operation is useful when you are preoccupied with other tasks and do not have the time to adjust the display.

10.2.1 How the automatic sounder works

The automatic sounder function automatically selects the proper gain, range scale and clutter suppression level according to the depth. It works as follows.

- The range changes automatically to locate the bottom on the lower half of the screen. The range jumps to one step shallower range when the bottom echoes reach a half way point of the full scale from the top and to one step deeper range when they come to the lower edge of the scale.
- The gain is automatically adjusted to display the bottom echo in reddish brown (default color arrangement).
- Clutter, which suppresses low level noise, is automatically adjusted.

10.2.2 Types of automatic sounder mode

Two types of automatic sounder modes are available: CRUISE and FISH. CRUISE is for tracking the bottom, and FISH is for searching fish schools. CRUISE uses a higher clutter rejection setting than FISH therefore it is not recommended for fish detection - weak fish echoes may be erased by the clutter suppression circuit.

10.2.3 How to enable automatic sounder operation

Using the soft key

1. Press the AUTO soft key to show the AUTO window.

MANUAL
FISH
CRUISE

Auto window

2. Rotate the [ENTER] knob to choose FISH or CRUISE as appropriate, and then push the [ENTER] knob.

Through the menu

1. Press the [MENU] key to show the menu bar.
2. Rotate the [ENTER] knob to choose SOUNDER and then push the [ENTER] knob to show the SOUNDER menu.
3. Rotate the [ENTER] knob to choose AUTO MODE PRESET and then push the [ENTER] knob.

   The AUTO MODE PRESET window appears.

MANUAL
FISH
CRUISE

Auto window

4. Rotate the [ENTER] knob to choose FISH or CRUISE as appropriate and then push the [ENTER] knob.
5. Press the [MENU] key to close the menu.

10.3 Manual Sounder Operation

Manual operation is useful for observing fish schools and bottom using a fixed gain setting.

The gain, range and range shift functions used together give you the means to select the depth you can see on the screen. The basic range can be thought of as providing a "window" into the water column and range shifting as moving the "window" to the desired depth.

10.3.1 Selecting the manual mode

Using the soft key

1. Press the AUTO soft key to show the AUTO window.
2. Rotate the [ENTER] knob to choose MANUAL and then push the [ENTER] knob.

Through the menu

1. Open the SOUNDER menu.
2. Rotate the [ENTER] knob to choose AUTO MODE PRESET and then push the [ENTER] knob.
3. Rotate the [ENTER] knob to choose MANUAL and then push the [ENTER] knob.
4. Press the [MENU] key to close the menu.

10.3.2 Selecting display range

Press the [RANGE +] or [RANGE -] key to select a range. The default ranges in feet are as below. Note that the range cannot be changed in the automatic sounder mode.

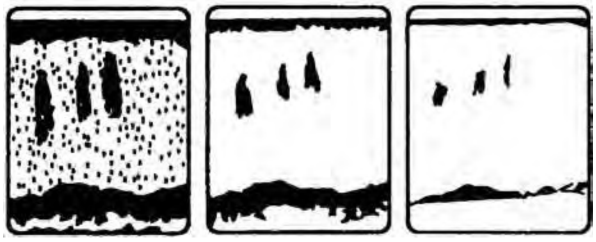
Default sounder range

Range 1	Range 2	Range 3	Range 4	Range 5	Range 6	Range 7	Range 8
15 ft	30 ft	60 ft	120 ft	200 ft	400 ft	1000 ft	1500 ft
3 fa	5 fa	10 fa	20 fa	40 fa	80 fa	150 fa	300 fa
5 m	10 m	20 m	40 m	80 m	150 m	300 m	500 m
3 pb	5 pb	10 pb	30 pb	50 pb	100 pb	200 pb	300 pb

You can change the default settings on the RANGES menu. Choose a range and use the [ENTER] knob to enter.

10.3.3 Adjusting the gain

Normally, set the gain to the point where excessive noise does not appear on the screen. Use a higher gain setting for greater depths and a lower setting for shallower water.



Gain too high　Gain proper　Gain too low

Examples of proper and improper gain

1. Push the [ENTER] knob to show the SENSITIVITY window.

   Note: This window can also be accessed with the SENSITIVITY menu.

GAIN 50*	**000**
NOISE LIMITER	HIGH
CLUTTER	0
WHITE MARKER	OFF
SIGNAL LEVEL	OFF

*: For menu operation, both of 50 and 200 frequencies appear.

Sensitivity window

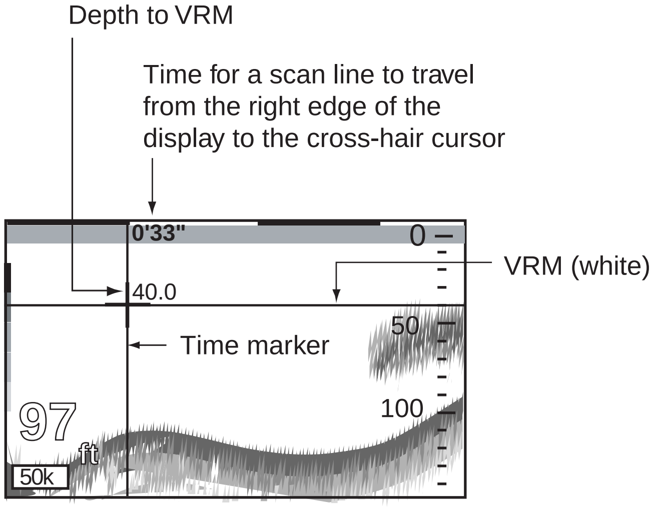
2. For menu operation, choose GAIN 50 (kHz) or GAIN 200 (kHz) as appropriate and then push the [ENTER] knob.
3. Rotate the [ENTER] knob to adjust. (Setting range: 0 to 100%)
4. Push the [ENTER] knob to set.
5. Press the [MENU] key to close the menu.

Note: Gain cannot be adjusted in the automatic sounder mode.

10.4 Measuring Depth, Time

The VRM measures the depth and the time marker, time.

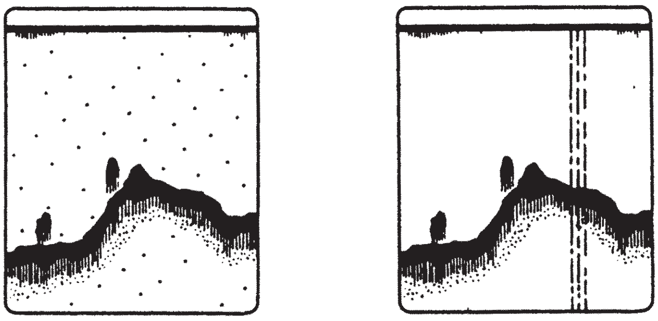
1. Rotate the [ENTER] knob to shift the VRM; counterclockwise to shift it upward, clockwise to shift it downward. You may also use the cursor pad (▲ ▼) to shift the VRM.
2. Press the cursor pad (◀ ▶) to adjust the time marker to measure time.



How to measure depth and time

10.5 Reducing Interference

Interference from other acoustic equipment operating nearby or other electronic equipment on your boat may show itself on the display as shown below.



Interference from other sounder

Electrical interference

Types of interference

To reduce interference, do the following:

1. Push the [ENTER] knob to show the SENSITIVITY window.

GAIN 50*	**000**
NOISE LIMITER	HIGH
CLUTTER	0
WHITE MARKER	OFF
SIGNAL LEVEL	OFF

*: For menu operation, both of 50 and 200 frequencies appear.

Sensitivity menu

2. Rotate the [ENTER] knob to choose NOISE LIMITER and then push the [ENTER] knob to show the noise limiter window.

OFF
LOW
MEDIUM
HIGH

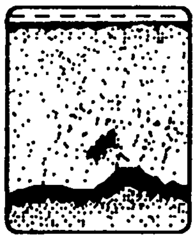
Noise limiter window

3. Rotate the [ENTER] knob to choose the degree of suppression desired (LOW, MEDIUM, HIGH) or turn the noise limiter off.
4. Push the [ENTER] knob and [MENU] key in order to close the menu.

Turn the noise limiter circuit off when no interference exists, otherwise weak echoes may be missed.

10.6 Reducing Low Level Noise

Light-blue dots may appear over most of the screen. This is mainly due to sediment in the water, or noise. This noise can be suppressed by adjusting CLUTTER on the SENSITIVITY menu.



Appearance of clutter

When the automatic sounder mode is used, clutter is automatically rejected. To reduce low level noise in manual sounder operation, do the following:

1. Push the [ENTER] knob to show the SENSITIVITY window.

GAIN 50*	**000**
NOISE LIMITER	HIGH
CLUTTER	0
WHITE MARKER	OFF
SIGNAL LEVEL	OFF

*: For menu operation, both of 50 and 200 frequencies appear.

Sensitivity menu

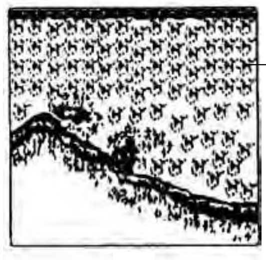
2. Rotate the [ENTER] knob to choose CLUTTER and then push the [ENTER] knob.

   The CLUTTER setting is shown in normal video.
3. Rotate the [ENTER] knob to choose the setting value.
4. Push the [ENTER] knob and [MENU] key in order to close the menu.

Note: The setting range is 0-7; the higher the value, the greater the suppression of low level noise. Choose "0" to turn clutter off.

10.7 Erasing Weak Echoes

Sediments in the water or reflections from plankton may be painted on the display in green or light-blue. These weak echoes may be erased as below.



Appearance of weak echoes

1. Push the [ENTER] knob to show the SENSITIVITY window.

GAIN 50*	000
NOISE LIMITER	HIGH
CLUTTER	0
WHITE MARKER	OFF
SIGNAL LEVEL	OFF

*: For menu operation, both of 50 and 200 frequencies appear.

Sensitivity menu

2. Rotate the [ENTER] knob to choose SIGNAL LEVEL and then push the [ENTER] knob to show the signal level window.

OFF
SL1
SL2
SL3
SL4

PALETTE settings on GENERAL menu: NOAA

OFF
SL1
SL2
SL3
SL4
SL5
SL6
SL7
SL8
SL9

PALETTE settings on GENERAL menu: other than NOAA

Signal level window

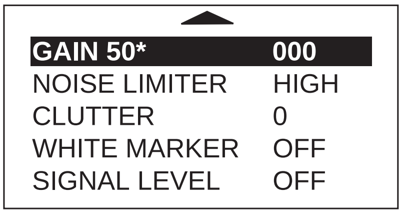
3. Rotate the [ENTER] knob to choose level of erasure or OFF as appropriate. The higher the number the stronger the echo that will be erased.
4. Push the [ENTER] knob and [MENU] key in order to close the menu.

Note: Unlike "clutter," signal level reduces display colors. Therefore, if you do not wish to reduce colors, use clutter instead.

10.8 White Marker

The white marker functions to display a particular echo color in white. For example, you may want to display the bottom echo in white to discriminate fish echoes near the bottom.

1. Push the [ENTER] knob to show the SENSITIVITY window.



*: For menu operation, both of 50 and 200 frequencies appear.

Sensitivity window

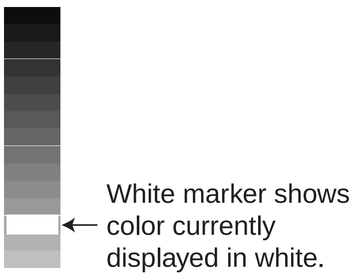
2. Rotate the [ENTER] knob to choose WHITE MARKER and then push the [ENTER] knob to show the white marker window.



White marker window

3. Rotate the [ENTER] knob to choose the value, and then push the [ENTER knob.
4. Rotate the [ENTER] knob to choose the color to display in white. (16: strongest color, 0: weakest color)

   As your rotate the knob, the number in the white marker window changes, the white marker on the echo strength bar shifts and the chosen echo color is displayed in white.



Color bar when white marker function is active

5. Push the [ENTER] knob and [MENU] key in order to close the menu.

To turn the white marker function off, choose "OFF" from the white marker window.

10.9 Picture Advance Speed

The picture advance speed determines how quickly the vertical scan lines run across the screen. When selecting a picture advance speed, keep in mind that a fast advance speed will expand the size of the fish school horizontally on the screen and a slow advance speed will contract it.

1. Open the SOUNDER menu.

AUTO MODE PRESET	**MANUAL**
DISPLAY MODE	NORMAL
FREQUENCY	50 KHz
PICTURE ADVANCE 1/1	
TEMPERATURE GRAPH	On
ZOOM MARKER	On
A-SCOPE	Off
SOUNDER SETUP	
SENSOR SETUP	

Sounder menu

2. Rotate the [ENTER] knob to choose PICTURE ADVANCE and then push the [ENTER] knob to show the picture advance window.

STOP
1/16
1/8
1/4
1/2
1/1
2/1

Picture advance window

3. Rotate the [ENTER] knob to choose speed desired.

   The fractions in the window denote the number of scan lines produced per transmission. For example, 1/8 means one scan line is produced every eight transmissions. STOP freezes the display and it is convenient for taking a picture of the display.
4. Push the [ENTER] knob and [MENU] key in order to close the menu.

Note: When using a plotter/sounder combination display, advancement of the sounder picture may be temporarily interrupted while the plotter display is being shifted or its display range is being changed.

10.10 Alarms

The sounder section has two conditions which generate audio and visual alarms: fish (normal) and fish (bottom lock) alarms.

You may set up the sounder alarms on the ALARMS menu, which may be displayed by choosing ALARMS from the menu bar.

AUDIBLE ALARM	**Off**
ARRIVAL ALARM	Off
XTE ALARM	Off
TEMPERATURE ALARM	Off
DEPTH ALARM	Off
ANCHOR ALARM	Off
STW ALARM	Off
GROUNDING ALARM	Off
GROUNDING ALARM RANGE	0.25 nm
GROUNDING ALARM REPORT	
FISH ALARM	Off
FISH ALARM (B/L)	Off

Alarms menu

10.10.1 Audio alarm On/Off

Audio and visual alarms are released whenever an alarm setting is violated. You can enable or disable the audible alarm as follows:

1. Press the [MENU] key to show the menu bar.
2. Rotate the [ENTER] knob to choose ALARMS and then push the [ENTER] knob to show the ALARMS menu.
3. Rotate the [ENTER] knob to choose AUDIBLE ALARM and then push the [ENTER] knob.

Internal
Internal+External
Off

4. Rotate the [ENTER] knob to choose Internal, Internal-External or Off as appropriate.
5. Push the [ENTER] knob.
6. Press the [MENU] key to close the menu.

10.10.2 Fish alarm

The fish alarm sounds when a fish echo is within the preset alarm range. Note that the sensitivity of the fish alarm can also be set.

1. Open the ALARMS menu.
2. Rotate the [ENTER] knob to choose FISH ALARM and then push the [ENTER] knob twice.

Off	
Depth	0000.0 ft
Range	0010.0 ft
Level	Medium

Fish alarm window

3. Rotate the [ENTER] knob to select On or Off as appropriate. For On, enter the depth, range and level (sensitivity).

   For Level, choose High (red and stronger echoes trigger the alarm), Med (yellow and stronger echoes trigger the alarm) or Low (blue and stronger echoes trigger the alarm.)
4. Push the [ENTER] knob and [MENU] key in order to close the menu.

10.10.3 Fish alarm (B/L)

The bottom-line fish alarm sounds when a fish echo is within a predetermined distance from the bottom.

1. Open the ALARMS menu.
2. Rotate the [ENTER] knob to choose FISH ALARM (B/L) and then push the [ENTER] knob twice.

Off	
Depth	0000.0 ft
Range	0030.0 ft

Fish alarm (B/L) window

3. Rotate the [ENTER] knob to select On or Off as appropriate. For On, enter the depth and range.
4. Push the [ENTER] knob and [MENU] key in order to close the menu.

10.11 Water Temperature Graph

The water temperature graph (appropriate sensor required) plots water temperature on the sounder display. It can be turned on or off as below.

1. Open the SOUNDER menu.
2. Rotate the [ENTER] knob to choose TEMPERATURE GRAPH and then push the [ENTER] knob.
3. Rotate the [ENTER] knob to select On.
4. Push the [ENTER] knob and [MENU] key to close the menu.

10.12 Reviewing Past Picture

One past picture can be reviewed. Note that this function is not available on dual frequency, bottom zoom and marker zoom displays.

1. Open the SOUNDER menu.
2. Rotate the [ENTER] knob to choose SOUNDER SETUP and then push the [ENTER] knob.
3. Rotate the [ENTER] knob to choose PLAYBACK SOUNDER IMAGE and then push the [ENTER] knob.

   Play
   S-Down
   Off

4. Rotate the [ENTER] knob to choose Play or S-Down.

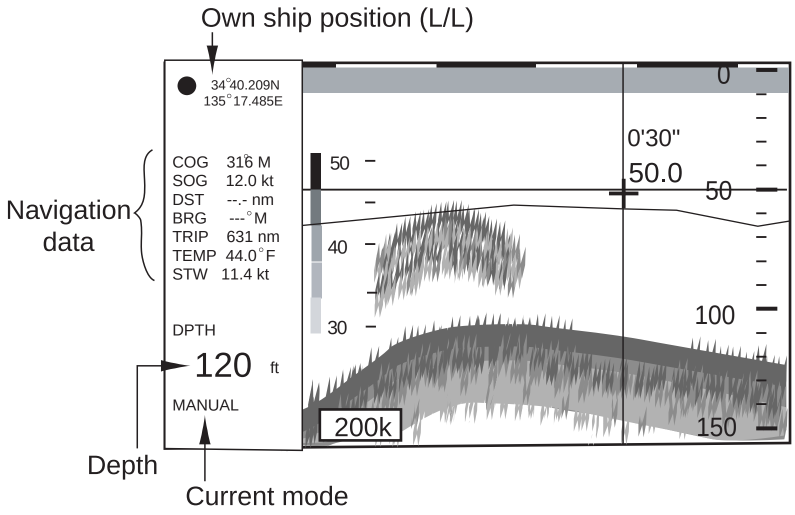
   Play: Rotate the [ENTER] knob clockwise to scroll the past picture.

   S-Down: The entire past picture appears.
5. Push the [ENTER] knob and [MENU] key to close the menu.
6. Push the [ENTER] knob to show the SENSITIVITY window.
7. Rotate the [ENTER] knob to choose Play or S-Down appropriate.
8. Rotate the [ENTER] knob to activate Play or S-Down.

   The time marker shows the time.
9. To cancel, press the [CLEAR] key.

10.13 Displaying Nav Data

You can show the navigation data at the left-hand side of the screen by pressing the NAVDATA ON soft key.



Sounder display, Nav data on

10.14 SOUNDER SETUP Menu

The SOUNDER SETUP menu sets up the sounder section.

1. Press the [MENU] key to show the main menu.
2. Rotate the [ENTER] knob to choose SOUNDER and then push the [ENTER] knob to show the SOUNDER menu.
3. Rotate the [ENTER] knob to choose SOUNDER SETUP and then push the [ENTER] knob to show the SOUNDER SETUP menu.

TRANSMISSION	Off
TRANSMISSION POWER	Low
TRANSDUCER	600 W
50 KHz TVG	00
200 KHz TVG	00
50 kHz ECHO OFFSET	+00
200 kHz ECHO OFFSET	+00
50 kHz BOTTOM LEVEL	+000
200 kHz BOTTOM LEVEL	+000
SMOOTHING	SM2
DEPTH INFORMATION	Large
PLAYBACK SOUNDER IMAGE	Off
ECHO SOUNDER SIMULATION	Off

Sounder setup menu

TRANSMISSION

Turns TX power on/off.
Normally, "On" should be selected. To stop transmission, select "Off".

TRANSMISSION POWER

Sets transmission power to High or Low.
Normally, select "High". When the gain becomes too high in shallow waters, select "Low".

TRANSDUCER

Selects the transducer to use, 600 W or 1 kW.

⚠ CAUTION

Select the transducer properly.

If not, the transducer may be damaged.

TVG (50 KHz, 200 kHz)

TVG (Time Varied Gain) compensates for propagation attenuation of the ultrasonic waves. It does this by equalizing echo presentation so that fish schools of the same size appear in the same density in both shallow and deep waters. In addition, it reduces surface noise. Note that if the TVG level is set too high short range echoes may not be displayed.

ECHO OFFSET (50 kHz, 200 kHz)

If the on-screen echo level appears to be too weak or in manual operation too strong and the level cannot be adjusted satisfactorily with the gain control on the display unit, adjust echo offset to compensate for too weak or too strong echoes.

BOTTOM LEVEL (50 kHz, 200 kHz)

If the depth indication is unstable in automatic operation or the bottom echo cannot be displayed in reddish-brown by adjusting the gain control in manual operation, you may adjust the bottom echo level detection circuit, for both 50 kHz and 200 kHz, to stabilize the indication.

Note: If the BOTTOM LEVEL is set too low, fish echoes may be recognized as the sea bottom, and the depth indication may be unstable. Reversely, if the setting is too high, the depth indication will not be displayed.

SMOOTHING

Smoothes echoes to present stable display. The higher the setting the greater the smoothing.

DEPTH INFORMATION

Selects the size of the depth indication, Large, Small or Off.

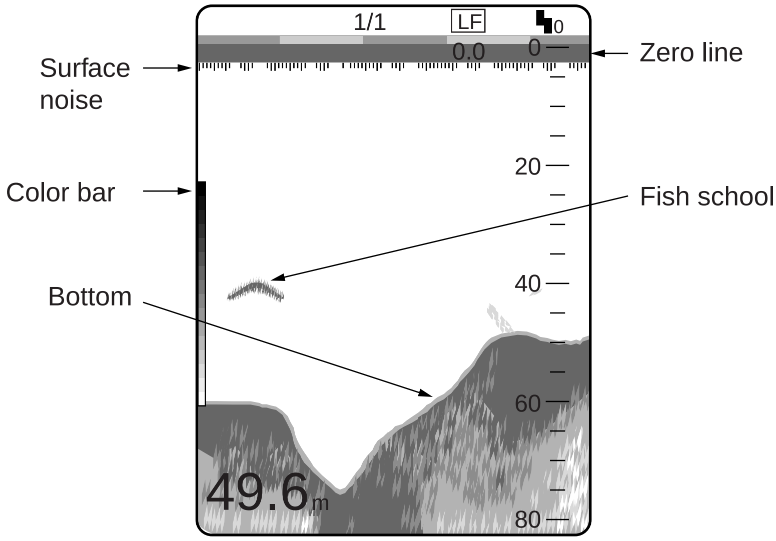
ECHO SOUNDER SIMULATION

Starts the echo sounder simulation mode.

For the SENSOR SETUP menu, see the installation manual.

10.15 Interpreting the Sounder Display

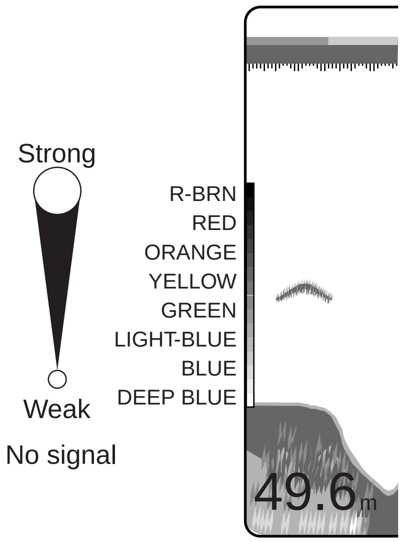
This section provides, using typical examples, information necessary for interpreting the display.



Typical display

Color bar

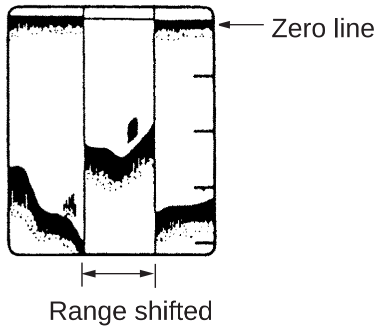
The color bar shows the relation between echo intensity and echo color on the screen. The top color (reddish brown) is the strongest color and the lower colors the weakest. The bar can be used as a reference to estimate density of a fish school, fish species and hardness of the bottom.



Color bar

Zero line

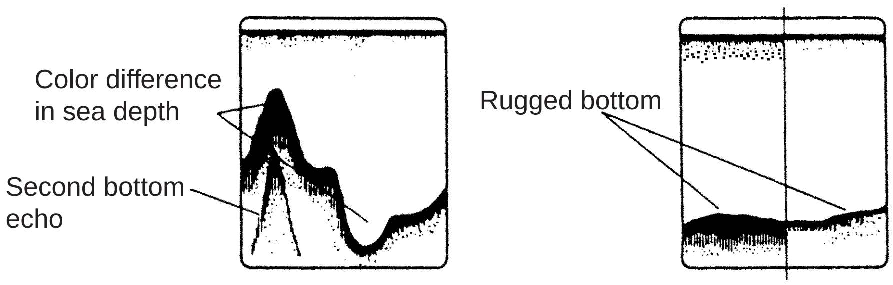
The zero line represents the transducer's position. It moves off the screen when a shifted range is used, or is shown at draft depth when ship's draft is entered.



Zero line

Bottom echoes

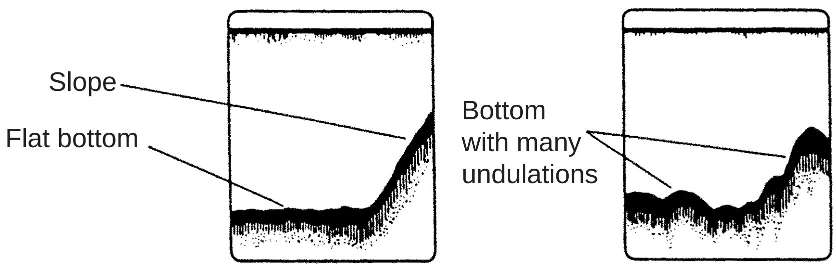
Bottom echoes are normally strongest and displayed in reddish brown or red, but colors and width will vary with bottom material, depth, sea condition, installation, frequency, pulselength and sensitivity.



Bottom material and bottom profile

Bottom profile

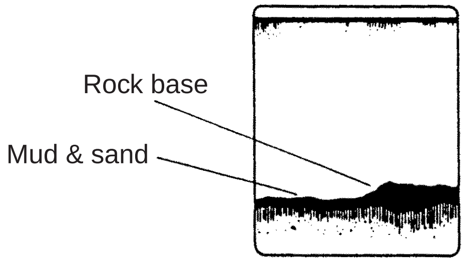
A hard and rough bottom appears with a longer tail because it reflects more of the ultrasonic pulse. Because of their stronger return, shallow echoes appear wider than deep ones even when all bottom conditions are equal. Also, a longer bottom tail appears on slopes because of the difference in traveling time at both edges of the beam angle. In the rugged bottom, echoes are reflected on many different planes, overlapping to present a 3D effect.



Bottom profile

Bottom nature

The nature of the bottom is known from the intensity and length of the bottom tail. Generally, when observing the bottom nature, the lower sounding frequency is used, the pulselength is set to long, and the gain setting is not disturbed. In the hard and craggy bottom, the bottom appears in reddish brown with a long tail. In the muddy or sandy bottom, the bottom appears less reddish and with a short tail. However, the bottom with sediment may give a long tail if a low frequency sounding is used.



Bottom nature

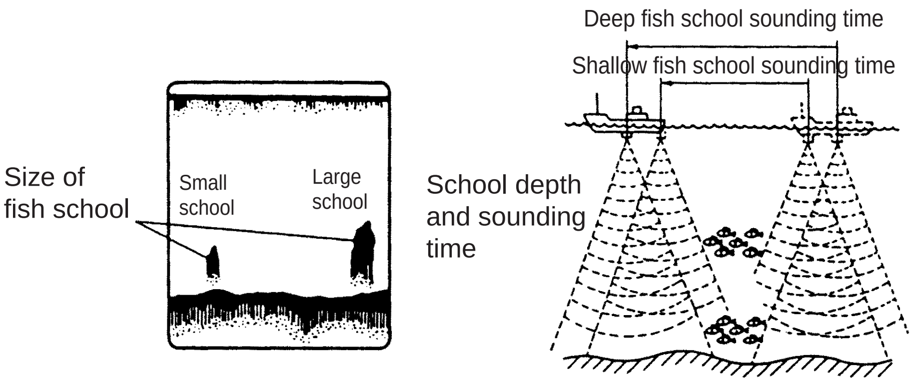
Fish schools

Fish quantity

Fish quantity can be estimated to a certain extent from fish echoes on the screen if fish school size and fish school density are kept in mind.

Fish school size

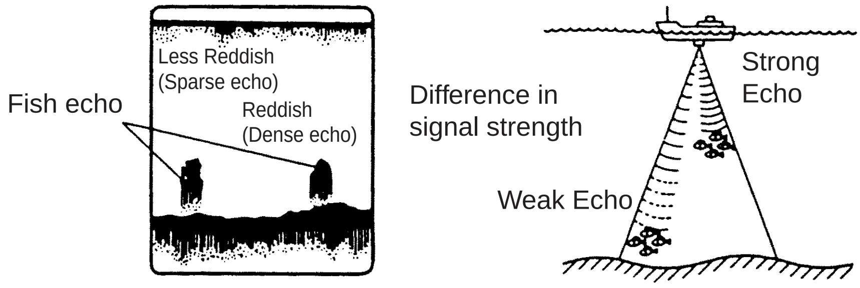
Usually the size of fish echoes on the screen is proportional to the actual size of the fish school. However, if two fish echoes appear at different depths with the same size, the fish school at shallower depth is smaller because the ultrasonic beam widens as it propagates and a fish school in deep water is displayed larger.



Fish school size

Fish school density

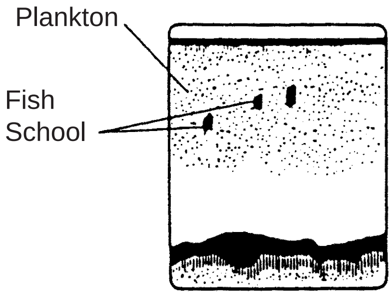
If two schools appear with the same color at different depth, the one in deeper water is denser because the ultrasonic wave attenuates as it propagates and the fish school in deep water tends to be displayed in a weaker color.



Fish school density

Plankton

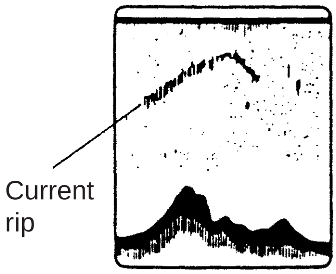
A plankton layer, a likely place to find fish, is displayed in green or blue dots. It usually descends in the day and rises at night.



Plankton

Current rip

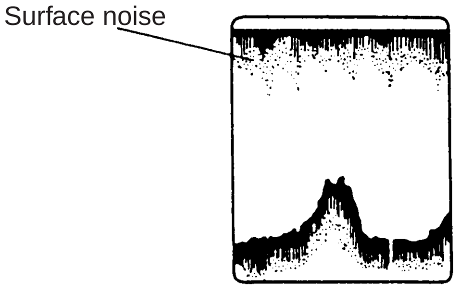
When two ocean currents meet with different speeds, directions and water temperatures, a current rip develops. A current rip's on-screen appearance is as shown below.



Current rip

Surface noise

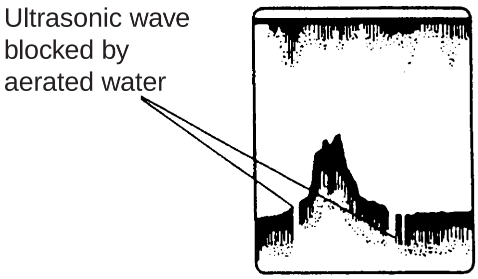
When the sea is rough or the ship passes over a wake, surface noise may appear at the top of the screen.



Surface noise

Aerated water

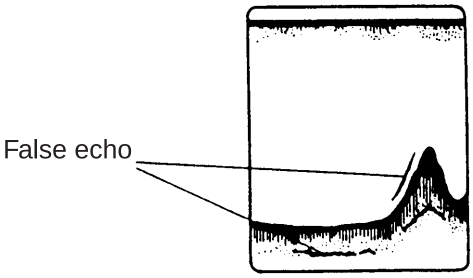
When the sea is rough or the ship makes a quick turn, gaps in the bottom echo on the screen may appear. This is caused by air bubbles which block propagation of the sound wave. Generally low frequency ultrasonic waves are interrupted more easily than high ones.

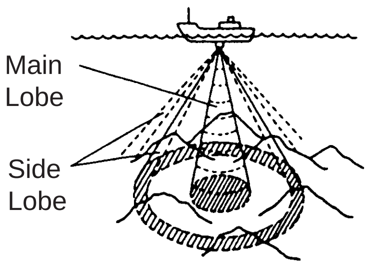


Aerated water

False echo

Every time ultrasonic pulse is transmitted, some radiation escapes on each side of the beam, called "side lobes." Echoes from side lobes show on the display as false images as below.





11. MAINTENANCE & TROUBLESHOOTING

11.1 Maintenance

Regular maintenance is important for continued performance. Important points to be checked from time to time are shown below.

WARNING

Do not open the equipment.

Hazardous voltage which can cause electrical shock exists inside the equipment. Only qualified personnel should work inside the equipment.

NOTE

Do not apply paint, anti-corrosive sealant or contact spray to coating or plastic parts of the equipment.

Those items contain organic solvents that can damage coating and plastic parts, especially plastic connectors.

Location	Check point	Remedy
Antenna unit	Check for loosened and corroded bolts.	Tighten loosened bolts. Replace heavily corroded bolts.
Antenna cable	Check connection point for watertightness.	Replace damaged parts.
	Check connector for tightness and corrosion.	
	Check cables for damage.	
Display unit connectors	Check for tight connection.	Tighten loosened connectors.
Ground terminal	Check for tight connection and corrosion.	Clean or replace as necessary.
Display unit	Dust and foreign material on the display unit.	Dust or dirt may be removed from the cabinet with soft cloth. Water-diluted mild detergent may be used if desired. DO NOT use chemical cleaners to clean the display unit; they may remove paint and markings. Wipe the LCD carefully to prevent scratching, using tissue paper and an LCD cleaner. To remove dirt or salt deposits, use an LCD cleaner, wiping slowly with tissue paper so as to dissolve the dirt or salt. Change paper frequently so the salt or dirt will not scratch the LCD.
Transducer	Check the transducer face for marine life, which can reduce sensitivity.	Remove marine life from the transducer when drydocking the boat. Use a piece of wood to remove any marine life.

11.2 Replacement of Fuse

⚠ CAUTION

Use the correct fuse.

Use of a wrong fuse can cause fire or damage the equipment.

The fuse on the power cable protects the system from reverse polarity of the ship's mains and equipment fault. If the fuse blows, find the cause before replacing it. Use only a 3A fuse. Using the wrong fuse will damage the unit and void the warranty.

Name	Type	Code No.
Fuse	FGBO-A 3A AC125V	000-549-063
	FGBO-A 125V 3A PBF	000-155-850-10

11.3 Replacement of Battery

A battery installed on the circuit board inside the display unit preserves data when the power is turned off. The life of the battery is about three years. When the battery voltage is low the battery icon ( ) appears on the display. When this happens, contact your dealer to request replacement of the battery.

Name	Type	Code No.
Battery	CR2477/1HF	000-150-460-10

Note: If you require data currently displayed, save it to a SD memory card before replacing the battery.

⚠ WARNING

Be sure the battery is inserted correctly.

Wrong polarity may cause an explosion.

11.4 Simple Troubleshooting

This section provides simple troubleshooting procedures which the user can follow to restore normal operation. If you cannot restore normal operation do not attempt to check inside the unit. Any trouble should be referred to a qualified technician.

General troubleshooting

If ...	Then ...
you cannot turn on the power	check for blown fuse.
	check that the power connector is firmly fastened.
	check for damaged power cable.
	check battery for proper voltage output.
	press the [POWER/BRILL] key a little harder.
no picture appears	press the [POWER/BRILL] key and then rotate the [ENTER] knob.
there is no response when a key is pressed	turn off and on the power.
the picture goes off suddenly*	press the [POWER/BRILL] key to turn the power on.

*: When turning off and on again the breaker, press the [POWER/BRILL] key to power on the equipment.

Plotter troubleshooting

If ...	Then ...
position is not fixed within 90 seconds	check that antenna connector is firmly fastened.
	check number of satellites received, on the GPS STATUS display.
position is wrong	enter position offset, on the ADVANCED menu.
the track is not plotted	check that On is selected at TRACK in the PLOTTER menu.
	check that On is selected at VISIBLE in the PLOTTER menu.
bearing is wrong	check the VARIATION in the ADVANCED menu.
the ship's speed indication is not zero after the ship is stopped	try to decrease SPEED FILTER in the ADVANCED menu.

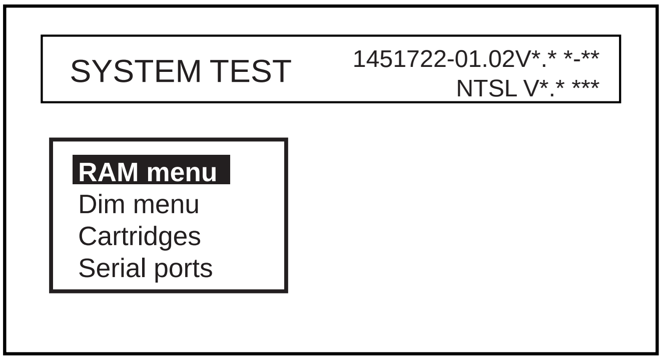
Sounder troubleshooting

If ...	Then ...
picture does not move although marks and characters appear	check if STOP is not selected at PICTURE ADVANCE on the SOUNDER menu.
	check for loosened transducer connector.
	on SOUNDER SETUP menu, set TRANSMISSION POWER to High.
zero line does not appear though the picture appears	the picture is shifted. Confirm shift setting.
picture sensitivity is too low	check gain setting, if using manual operation.
	marine life or air bubbles may be clinging to transducer face.
	on SOUNDER SETUP menu, set TRANSMISSION POWER to High.
the depth indication is not displayed	adjust gain and range to display the bottom echo in reddish brown, if you are using the manual operation.
noise or interference shows on the display	if no noise appears after turning the engine off, the engine interference is suspected. Call your dealer.
	check the ground.
	other video sounder of the same frequency as yours may be operating near you.
temperature of the water on the water temperature graph is wrong.	check that sensor cable is tightly fastened.

11.5 Diagnostics

This section provides the procedures for testing the equipment for proper operation. Four tests are provided: RAM menu, Dim menu, Cartridges and Serial ports. To access the test menu, do the following:

1. Press the [POWER/BRILL] key to turn on the equipment while holding the [CLEAR] key down.
2. Release the [CLEAR] key when you hear the beep.



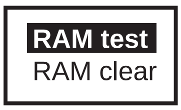
*: Program version No.

SYSTEM TEST menu

11.5.1 RAM menu

The RAM menu checks memory circuit. Results for device checks are shown as OK or NG (No Good). For any NG, request service.

1. Rotate the [ENTER] knob to choose "RAM menu" on the SYSTEM TEST.
2. Push the [ENTER] knob to show the RAM window.



RAM window

3. Rotate the [ENTER] knob to select "RAM test" and then push the [ENTER] knob to start the RAM test.
4. Confirm that "OK" appears.

11.5.2 Dim menu

The Dim menu checks the contrast and backlight control circuits for proper operation.

1. Rotate the [ENTER] knob to choose "Dim menu" on the SYSTEM TEST.
2. Push the [ENTER] knob to show the Dim window.

Contrast
Backlight

Dim window

3. Rotate the [ENTER] knob to select "Contrast" or "Backlight" as appropriate, and then push the [ENTER] knob.
4. Press the cursor pad to change the setting.
5. Confirm that the contrast or backlight changes appropriately.

11.5.3 Cartridge

The Cartridge item checks internal chart data or the chart card data in use.

Checking the internal chart data

1. Rotate the [ENTER] knob to choose "Cartridge" on the SYSTEM TEST.
2. Push the [ENTER] knob to show the Cartridge window.

Internal Data Base Test
SD-CARD TEST
SD-CARD CONNECTOR

Cartridge window

3. Rotate the [ENTER] knob to choose "Internal Data Base Test" and then push the [ENTER] knob to start the test.
4. Confirm the test result.

Checking the chart card in use

1. Rotate the [ENTER] knob to choose "SD-CARD TEST" on the Cartridge window.
2. Push the [ENTER] knob to show the card test display.
3. Confirm the test result.

11.5.4 Serial ports

You can confirm the signal input.

1. Rotate the [ENTER] knob to choose Serial port from the SYSTEM TEST.
2. Push the [ENTER] knob to show the Serial port window.

Change parameters
Input data display

Serial port

3. Rotate the [ENTER] knob to choose "Change parameters" and then push the [ENTER] knob.

Port:	**PORT2**
Baud Rate:	4800
Data Bits:	8
Parity:	none
Stop Bits:	1

4. Enter the settings for the port in use and then push the [CLEAR] key.
5. Rotate the [ENTER] knob to choose "Input data display" and then push the [ENTER] knob.
6. Press the [CLEAR] key twice to finish.

Note: When choosing Input data display, the data input from the external equipment connected are shown.

11.6 Program No.

You can confirm the software program No by following procedure.

1. At the Rotate the [ENTER] knob to choose "ADVANCED", and then push the [ENTER] knob.
2. Rotate the [ENTER] knob to choose "SYSTEM UPDATE", and then push the [ENTER] knob to show the System update menu.

System Update

Plotter SW version:	1451722-**.**
SW Development No:	10.06.***
Kernel:	1.03.***
NTSL:	6.01.***
BIOS:	1.02.***
File System:	3.00.***
Worldwide Charts	*.**
GPS:	485026****
Sounder:	1451716-**.**

Update Plotter Software
Update Worldwide Maps

*: Program version No.

3. To escape from the System update menu, press the [MENU] key.

11.7 Clearing the Memory

The memory can be cleared to restart operation with default settings. All tracks, waypoints and routes are deleted and all default menu settings are restored.

1. Turn the power on while holding the [CLEAR] key down.
2. Release the [CLEAR] key when you hear the beep.
3. Rotate the [ENTER] knob to choose "RAM menu" and then push the [ENTER] knob.

RAM test
RAM clear

RAM window

4. Rotate the [ENTER] knob to choose "RAM clear" and then push the [ENTER] knob.

   The message "Are you sure?" appears.
5. Push the [ENTER] knob to clean the memory.
6. Press the [CLEAR] key.
7. Press the [POWER/BRILL] key to turn the power off.

11.8 GPS Cold Start

Cold start clears the Almanac (stored in the memory) to receive the latest Almanac from the GPS satellites. When the equipment has not been used for a long time (over one year), execute cold start as shown below to receive the latest Almanac.

1. Choose ADVANCED from the menu bar, and then push the [ENTER] knob to show the ADVANCED menu.
2. Rotate the [ENTER] knob to choose INPUT/OUTPUT, and then push the [ENTER] knob.
3. Rotate the [ENTER] knob to choose INTERNAL GPS SETUP and then push the [ENTER] knob.

RESTART GPS	
INTERNAL GPS	On

Internal GPS setup window

4. Rotate the [ENTER] knob to choose RESTART GPS.
5. Push the [ENTER] knob to restart.

12. AIS OPERATION

Connected to an AIS transponder which outputs data in RS-232C format, your plotter can show the name, position and other nav data of AIS transponder equipped ships.

12.1 Turning AIS Feature On/Off

To activate the AIS feature, do the following.

1. Press the [MENU] key to show the menu bar.
2. Rotate the [ENTER] knob to choose ADVANCED and then press the [ENTER] knob.
3. Rotate the [ENTER] knob to choose AIS SETUP and then press the [ENTER] knob to show the AIS menu.

DISPLAY	**On**
ACTIVATION RANGE	05.0 nm
CPA ALARM	Off
CPA LIMIT	00.5 nm
TCPA ALARM	Off
TCPA LIMIT	10 min

AIS menu

4. Rotate the [ENTER] knob to choose DISPLAY and then push the [ENTER] knob.
5. Rotate the [ENTER] knob to choose On and then push the [ENTER] knob.
6. Rotate the [ENTER] knob to choose ACTIVATION RANGE and then push the [ENTER] knob.
7. Rotate the [ENTER] knob to set the range from own ship and then press the SAVE soft key. (Setting range: 0.1 to 50.0 nm)

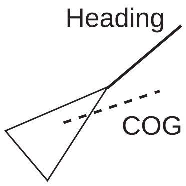
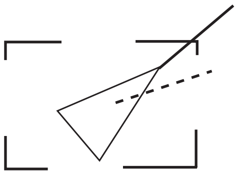
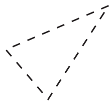
   AIS targets within this range will be monitored.
8. Press the [MENU] key to close the menu.

When turning the AIS feature off, choose Off at step 5.

12.2 AIS Symbols

AIS-equipped ships are marked on the display at their current position with the appropriate AIS symbol as shown below.

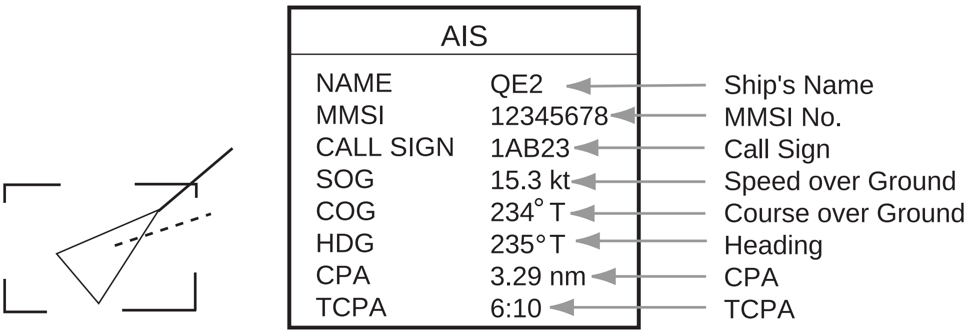
AIS symbols

Symbol	Description
 Activated target	Activated automatically or manually. The dashed line shows ship's COG. The solid shows target heading.
 Target selected for data display	Target selected by use for data display.
 Lost target	A target is declared a lost target when no data is received for three to five reporting intervals. When this occurs, the target is marked with the dashed triangle.

12.3 Displaying Target Data

To display the data of an AIS target.

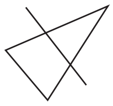
1. Place the cursor on an AIS target symbol.
2. Push the [ENTER] knob to show the target's basic data. The target is marked as below.



Activated target selected and AIS target data window

12.4 Lost Target

A target is declared a lost target when no data is received for three to five reporting intervals. When this occurs, the target is marked with the lost target symbol.



The lost target will be erased automatically if no data is received within 10 minutes.

12.5 CPA and TCPA

When the predicted CPA of any target becomes smaller than a preset CPA (Closest Point of Approach) alarm range and its predicted TCPA (predicted time to CPA) are less than a preset TCPA alarm limit, an audio alarm sounds, the messages CPA ALARM and TCPA ALARM appear. In addition, the AIS target plot symbol of the offending target changes to a triangle and flashes together with its vector. You may silence the audio alarm with the [CLEAR] key. The flashing of the triangle plot symbol continues until you intentionally terminate tracking by pressing [CLEAR] key tracking of the target. This feature helps alert you to targets which may be on a collision course with own ship.

Setting CPA and TCPA

CPA/TCPA alarm range must be set up properly taking into consideration the size, tonnage, speed, turning performance and other characteristics of own ship. Follow the steps shown below to set the CPA/TCPA alarm range.

1. Choose AIS SETUP from the ADVANCED menu and then push the [ENTER] knob.
2. Choose CPA LIMIT and then push the [ENTER] knob.
3. Rotate the [ENTER] knob to set a CPA limit desired. (Setting range: 0.5 to 50.0 nm)
4. Press the SAVE soft key.
5. Choose TCPA LIMIT and then push the [ENTER] knob.
6. Rotate the [ENTER] knob to set a TCPA limit desired. (Setting range: 1 to 30 minutes)
7. Press the SAVE soft key.
8. Press the [MENU] key to close the menu.

Activating CPA/TCPA alarm

To activate CPA/TCPA alarm you set, do the following.

1. Choose AIS SETUP from the ADVANCED menu and then push the [ENTER] knob.
2. Rotate the [ENTER] knob to choose CPA ALARM or TCPA ALARM appropriately and then push the [ENTER] knob.
3. Rotate the [ENTER] knob to choose On and then push the [ENTER] knob.
4. Press the [MENU] key to close the menu.

APPENDIX

Menu Tree

Plotter

- MENU BAR
  - GENERAL
    - LANGUAGE (***English***, others)
    - KEYPAD BEEP (Off, ***On***)
    - PALETTE (***Normal***, SunLight, Night, NOAA)
    - TIME LINE (***Infinite***, Off, 2 min, 10 min, 30 min, 1 hour, 2 hours)
    - TIME REFERENCE (***UTC***, -19:30 to +19:30 (in 30 min. steps))
    - TIME FORMAT (***12 hour***, 24 hour)
    - DATE FORMAT (***MM-DD-YY***, DD-MM-YY)
    - AUTO INFO (OFF, ***On Points***, On All)
    - SHIP ICON (**●**, ○, ▲)
    - SHIP OFFSET (***Off***, On)
    - WIND GRAPH (***True***, Apparent)
    - UNITS OF MEASURE
      - DISTANCE (***nm***, sm, km, nm+ft, nm+m, sm+ft)
      - SPEED (***kt***, mph, km/h)
      - DEPTH (***ft***, fa, m, pb)
      - ALTITUDE (***ft***, fl, m)
      - TEMP (°C, °***F***)
  - PLOTTER
    - TRACK
      - TRACKING (***Off***, On)
      - ACTIVE TRACK (***1***, 2, 3, 4, 5)
      - VISIBLE (***On***, Off)
      - LINE COLOR (***Black***, L-green, Red, Pink, Yellow, Gray, Brown, Dark-green)
      - DELETE (***Yes***, No)
      - STEP UNIT (Time, ***DIST***)
      - DISTANCE (0.01, 0.05, ***0.1***, 0.5, 1.0, 2.0, 5.0, 10.0)
      - TIME (1 sec, 5 sec, 10 sec, 30 sec, ***1 min***, 5 min, 10 min, 30 min, 1 h)
    - ROUTES (Shows the route list.)
    - WAYPOINTS (Shows WAYPOINT LIST.)
    - MEMORY CARD (Shows MEMORY CARD list.)
  - MAP
    - ZOOM TYPE (***Standard***, Flexi-Zoom)
    - FONTS & SYMBOLS (***NORMAL***, LARGE)
    - PERSPECTIVE VIEW (***Off***, On)
    - DYNAMIC NAV-AIDS (***Off***, On)
    - MIXING LEVELS (Off, ***On***)
    - SAFETY STATUS BAR (***Off***, On, Icon)
    - NAV AIDS PRESENTATION (US, ***International***)
    - CURRENTS PREDICTION (Shows the current prediction window.)
    - MAP CONFIGURATIONS
      - DISPLAY MODE (Full, Medium, Low, Tides, ***Custom***)
        - MARINE SETTINGS
          - NAMES (***On***, Off)
          - NAME TAGS (***On***, Off)
          - NAV AIDS & LIGHT SECTORS (***On***, Off, NO SECTOR)
          - ATTENTION AREAS (***On***, Off)
          - TIDES & CURRENTS (***On***, Off)
          - SEABED TYPE (***On,*** Off)
          - PORTS & SERVICES (***On***, Off)
          - TRACKS & ROUTES (***On***, Off)
        - UNDERWATER OBJECTS SETTINGS
          - UNDERWATER OBJECTS LIMIT (0-1000 ft / 0-166 fa / 0-304 m / 0-184 pb, ***33 ft***)
          - ROCKS (***Icon***, Off, Icon+Depth)
          - OBSTRUCTIONS (***Icon***, Off, Icon+Depth)
          - DIFFUSERS (***Icon***, Off, Icon+Depth)
          - WRECKS (***Icon***, Off, Icon+Depth)
        - DEPTH SETTINGS
          - DEPTH RANGE MIN (07, 16, 33 ft / 1, 3, 6 fa / 2, 5, 10 m / 1, 3, 6 pb, ***33 ft***)
          - DEPTH RANGE MAX (16, 33, 66 ft / 3, 6, 11 fa / 5, 10, 20 m / 3, 6, 12 pb, ***66 ft***)
        - LAND SETTINGS
          - LAND ELEVATIONS (On, ***Off***)
          - LAND ELEVATION VALUES (***On***, Off)
          - ROADS (***On,*** Off)
          - POINTS OF INTEREST (***On,*** Off)
        - CHART SETTINGS
          - LAT/LON GRID (On, ***Off***)
          - CHART BOUNDARIES (***Auto,*** On, Off)
          - VALUE-ADDED DATA (***On,*** Off)
          - CHART LOCK (***On***, Off)
  - (1)

1

- ALARMS
  - AUDIBLE ALARM (***Off***, Internal, Internal+External)
  - ARRIVAL ALARM (***Off***, 0.00 to 5.39 nm)
  - XTE ALARM (**Off**, 0.00 to 5.39 nm)
  - TEMPERATURE ALARM (***Off***, MAX/MIN: -004.00 to +103.98 °F)
  - DEPTH ALARM (***Off***, Depth/Range: 0 to 9999.9 ft)
  - ANCHOR ALARM (***Off***, 0.00 to 5.39 nm)
  - STW ALARM (***Off***, MAX/MIN: 000.0 to 539.9 kt)
  - GROUNDING ALARM (**Off**, 0 to 65 ft)
  - GROUNDING ALARM RANGE (***0.25 nm,*** 0.5 nm, 1.0 nm)
  - GROUNDING ALARM REPORT
  - FISH ALARM (***Off***, Depth/RANGE: 000.0 to 4000 ft, Level: High, ***Medium***, Low)
  - FISH ALARM (B/L) (***Off***, Depth: 0 to 400, Range: 0 to 30.0 ft)
- ADVANCED
  - FIX
    - FIX CORRECTION (***Off***, On)
    - COMPUTE CORRECTION
    - CORRECTION OFFSET
    - POSITION FILTER (***Off***, Low, Medium, High)
    - SPEED FILTER (***Off***, Low, Medium, High)
  - NAVIGATE
    - COORDINATE SYSTEM (***ddd mm.mmm***, ddd mm ss, ddd mm.mm, ddd. ddddd, TD)
    - MAP DATUM (TOKYO, ***WGS 1984*** etc.)
    - MAP ORIENTATION (***North Up***, Course Up, Auto Course Up)
    - MAP ORIENTATION RES (05 to 60°, ***30***°)
  - COMPASS
    - BEARINGS (***Mag***, True)
    - VARIATION (***Auto,*** 99.9 E to 99.9 W)
    - CALIBRATION
  - INPUT/OUTPUT
    - INTERNAL GPS SETUP (***RESTART GPS,*** INTERNAL GPS (***On***, Off), WAAS SEARCH (***Auto***, Manual))
    - NMEA 1 INPUT (NMEA-0183 1200-N81-N, ***NMEA-0183 4800-N81-N,*** NMEA-0183 4800-N82-N, NMEA-0183 9600-N81-N, NMEA-0183 9600-O81-N, C-COM, AIS 38400, Disabled)
    - NMEA 1 OUTPUT (***GLL, VTG***, BWR, DBT, DPT, MTW, VHW, WCV, APA, ***APB***, HDG, BOD, XTE, RMA, ***RMB, RMC***, GGA, HSC, AAM, GTD, MWV, ZDA, ***WPL, RTE, TLL Out***)
    - NMEA 2 INPUT (NMEA-0183 1200-N81-N, ***NMEA-0183 4800-N81-N,*** NMEA-0183 4800-N82-N, NMEA-0183 9600-N81-N, NMEA-0183 9600-O81-N, C-COM, AIS 38400, Disabled)
    - NMEA 2 OUTPUT (***GLL, VTG***, BWR, DBT, DPT, MTW, VHW, WCV, APA, ***APB***, HDG, BOD, XTE, RMA, ***RMB, RMC***, GGA, HSC, AAM, GTD, MWV, ZDA, ***WPL, RTE, TLL Out***)
    - RS232/NMEA 3 INPUT (NMEA-0183 1200-N81-N, ***NMEA-0183 4800-N81-N,*** NMEA-0183 4800-N82-N, NMEA-0183 9600-N81-N, NMEA-0183 9600-O81-N, C-COM, AIS 38400, Disabled)
    - RS232 3 OUTPUT (***GLL, VTG***, BWR, DBT, DPT, MTW, VHW, WCV, APA, ***APB***, HDG, BOD, XTE, RMA, ***RMB, RMC***, GGA, HSC, AAM, GTD, MWV, ZDA, ***WPL, RTE, TLL Out***)
    - INPUT 3 MODE (***RS232***, NMEA)
    - WPL/RTE FORMAT (***Standard***, Furuno)
    - EXTERNAL EVENT (***Off***, WPT, MOB)
    - C-LINK (Secondary Station, Primary Station, ***Off***)
    - DEPTH SOURCE (NMEA, ***Sounder***)
    - TEMP SOURCE (NMEA, ***Sounder***)
    - STW SOURCE (NMEA, ***Sounder***)
  - EXT NMEA
    - DRAFT SETUP (-20.0 - +39.9 ft, ***0.0***)
    - SPEED CALIBRATION (-50 - +50%, ***0***)
    - TEMP CALIBRATION (-50 - +50 °F, ***0.0***)

2

3

- 3
  - INFO
  - FIND
    - PORT SERVICES
    - PORT
    - TIDE STATIONS
    - WRECKS
    - OBSTRUCTIONS
    - PORT BY DISTANCE
    - LAKES INFO
    - LAKE BY NAME
    - POINTS OF INTEREST
    - ROUTES
    - WAYPOINTS
    - COORDINATES (Longitude/Latitude)

- 2
  - GPS SIMULATION
    - SIMULATION MODE (***Off***, On)
    - COURSE (***0***° to 359)
    - SPEED (0 to 539 kt, ***1.0***)
    - DATE
    - TIME
    - CURSOR CONTROL (***Off***, On)
    - SELECT POSITION
  - ECHO SOUNDER SIMULATION (***Off***, On)
  - AIS SETUP
    - DISPLAY (***Off***, On)
    - ACTIVATION RANGE (0.1 to 50.0, ***5.0 nm***)
    - CPA ALARM (***Off***, On)
    - CPA LIMIT (0.5 to 50.0, ***0.5 nm***)
    - TCPA ALARM (***Off***, On)
    - TCPA LIMIT (1 to 30, ***10 min***)
  - C-MAP WEATHER SERVICE
  - SYSTEM UPDATE

Sounder

MENU BAR

- GENERAL (See page AP-1.)
- SOUNDER
  - AUTO MODE PRESET (***MANUAL***, FISH, CRUISE)
  - DISPLAY MODE (***NORMAL***, BOTTOM LOCK, BOTTOM ZOOM, MARKER ZOOM, BOTTOM DISCRIMINATION)
  - FREQUENCY (***50 kHz***, 200 kHz)
  - PICTURE ADVANCE (STOP, 1/16, 1/8, 1/4, 1/2, ***1/1***. 2/1)
  - TEMPERATURE GRAPH (***Off***, On)
  - ZOOM MARKER (***Off***, On)
  - A-SCOPE (***Off***, On)
  - SOUNDER SETUP
    - TRANSMISSION (Off, ***On***)
    - TRANSMISSION POWER (***High,*** Low)
    - TRANSDUCER (***600 W***, 1 kW)
    - 50 kHz TVG (***00*** to 10)
    - 200 kHz TVG (***00*** to 10)
    - 50 kHz ECHO OFFSET (-50 to +50, ***00***)
    - 200 kHz ECHO OFFSET (-50 to +50, ***00***)
    - 50 kHz BOTTOM LEVEL (-100 to +100, ***000***)
    - 200 kHz BOTTOM LEVEL (-100 to +100, 000)
    - SMOOTHING (***Off***, SM1, SM2, SM3, SM4)
    - PLAYBACK SOUNDER IMAGE (***Off***, Play, S-Down)
    - ECHO SOUNDER SIMULATION (***Off***, On)
  - SENSOR SETUP
    - DRAFT (-20.0 to 39.9 ft, ***000.0***°)
    - SPEED CALIBRATION (-50 to +50%, ***00.0***)
    - TEMP CALIBRATION (-50 to 5 °F, ***0.0***)
    - ACOUSTIC SPEED CALIBRATION (-50 to +50 m/s, ***0***)
- SENSITIVITY
  - GAIN 50 (0 to 100, 80)
  - GAIN 200 (0 to 100, 80)
  - NOISE LIMITER (***OFF***, LOW, MEDIUM, HIGH)
  - CLUTTER (0 to 7, ***4***)
  - WHITE MARKER (***OFF***, 1 to 16)
  - SIGNAL LEVEL (Off, SL1 to SL9)*

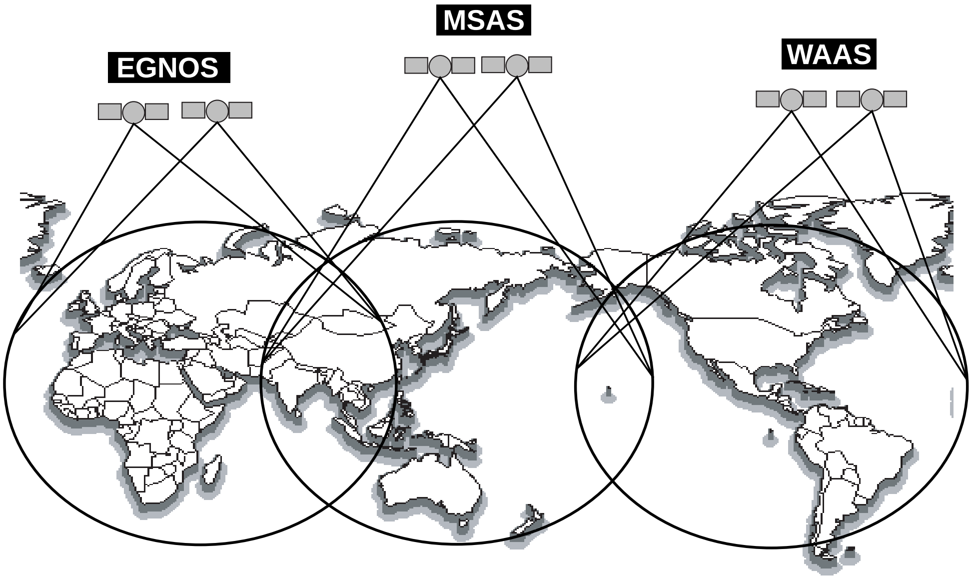
*: When PALETTE setting is NOAA: SL1 to SL4.

- ALARMS (See page AP-2)
- RANGES
  - RANGE 1 (7 to 4000 ft, ***15 ft***)
  - RANGE 2 (7 to 4000 ft, ***30 ft***)
  - RANGE 3 (7 to 4000 ft, ***60 ft***)
  - RANGE 4 (7 to 4000 ft, ***120 ft***)
  - RANGE 5 (7 to 4000 ft, ***200 ft***)
  - RANGE 6 (7 to 4000 ft, ***400 ft***)
  - RANGE 7 (7 to 4000 ft, ***1000 ft***)
  - RANGE 8 (7 to 4000 ft, ***1500 ft***)
  - ZOOM RANGE (15 to 400 ft, ***30 ft***)
  - BOTTOM LOCK RANGE (15, ***30*** ft)

Range 1	Range 2	Range 3	Range 4	Range 5	Range 6	Range 7	Range 8	Setting range
3 fa	5 fa	10 fa	20 fa	40 fa	80 fa	150 fa	300 fa	666
5 m	10 m	20 m	40 m	80 m	150 m	300 m	500 m	1219
3 pb	5 pb	10 pb	30 pb	50 pb	100 pb	200 pb	300 pb	738

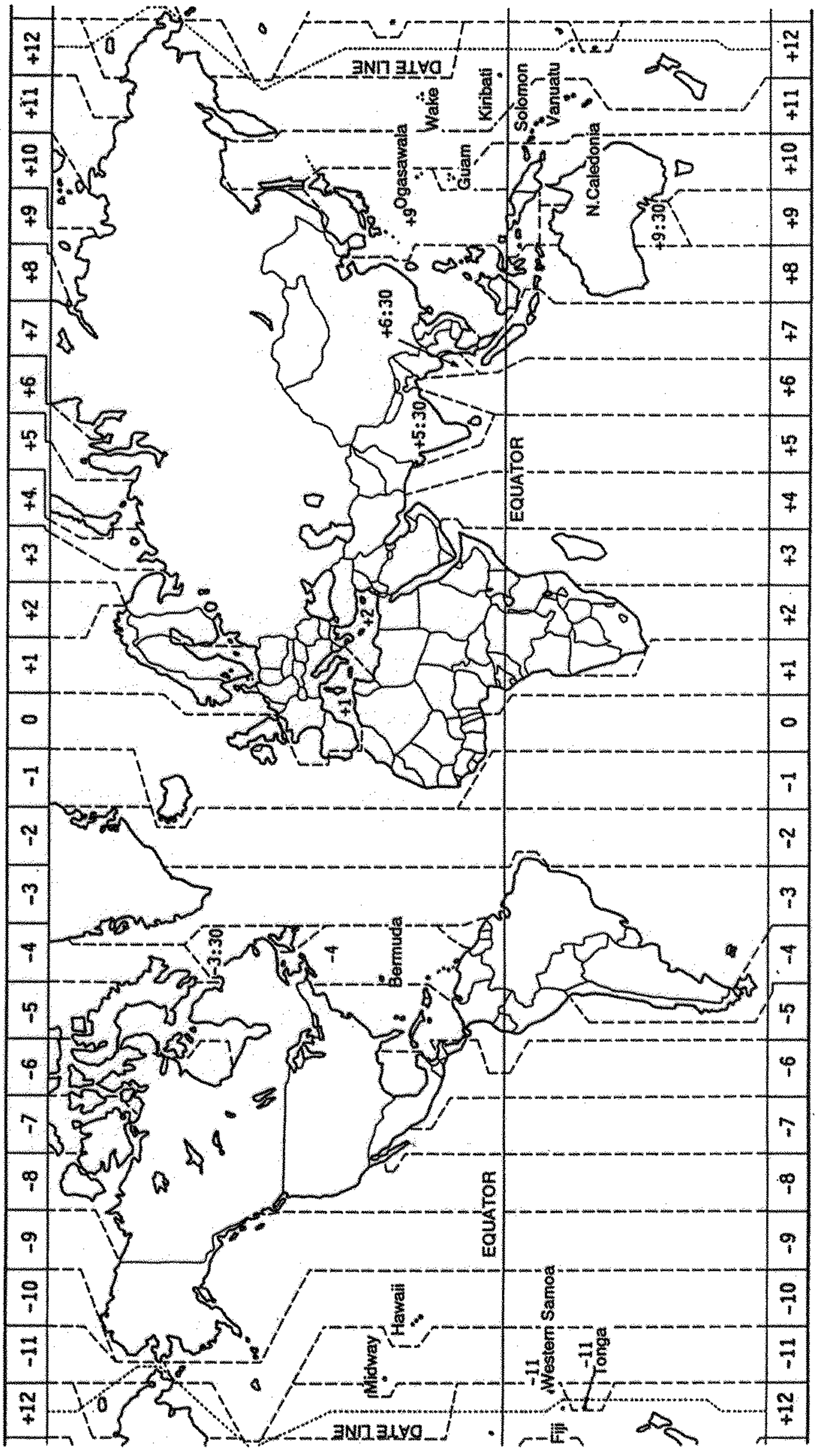
What is WAAS?

WAAS, available in North America, is a provider in the worldwide SBAS (Satellite Based Augmentation System) navigation system. CBAS provides GPS signal corrections to SBAS users, for even better position accuracy, typically better than three meters. There are two more SBAS providers, MSAS (Multi-Functional Satellite Augmentation System) for Japan and EGNOS (Euro Geostationary Navigation Overlay Service) for Europe. All providers are compatible with one another, thus providing seamless position fixes to SBAS users. The illustration below shows the coverage area. (Accuracy may be affected when using a GEO satellite not within your current location.) This manual uses WAAS for these three providers generically.



Provider	Satellite type	Longitude	Satellite No.
WAAS	Inmarsat-3-F4	142°E	122
	Inmarsat-3-F3 (POR)	178°E	134
	Intelsat Galaxy XV	133°W	135
	TeleSat Anik FIR	107.3°W	138
EGNOS	Inmarsat-3-F2 (AOR-E)	15.5°W	120
	Artemis	21.5°E	124
	Inmarsat-3-F5 (IOR-W)	25°E	126
MSAS	MTSAT-1R	140°E	129
	MTSAT-2	145°E	137

World Time Chart



SPECIFICATIONS OF GPS PLOTTER/SOUNDER
GP-7000F

1 GENERAL

1.1	Display	7-inch wide color TFT color LCD, 480 (W) x 234 (H) dots
1.2	Projection	Mercator
1.3	Usable Area	80° latitude or below
1.4	Display Mode	Plotter, Nav Data, Highway display, Compass display
1.5	Alarms	Arrival and Anchor watch, Cross track error, Temperature, Depth, Grounding, Ship's speed alarms

2 GPS RECEIVER

2.1	Receiving Channels	
	GPS	12 channels parallel, 12 satellites tracking
	WAAS	1 channel
2.2	Rx Frequency	1575.42 MHz
2.3	Rx Code	C/A code, WAAS
2.4	Position Fixing System	All in view, 8-state Kalman filter
2.5	Position Accuracy	
	GPS	10 m (95% of the time, HDOP≤ 4)
	WAAS	3 m (95% of the time)
2.6	Tracking Velocity	999 kt
2.7	Position-fixing Time	Warm start: 12 s approx., Cold start: 90 s approx.
2.8	Position Update Interval	1 s

3 PLOTTER FUNCTIONS

3.1	Effective Projection Area	Depending on chart card in use
3.2	Track Display	Plot interval: by time (1 sec, 5 sec, 10 sec, 30 sec, 1 min, 5 min, 10 min, 30 min, 1 h) or by distance (0.01, 0.05, 0.1, 0.5, 1.0, 2.0, 5.0, 10.0 nm)
3.3	Memory Capacity	Track: 12000 points, waypoint: 2000 points Route: 200 routes with 35 waypoints each
3.4	MOB	1 point
3.5	Quick Routes	1 route
3.6	Electronic Chart Card	C-MAP NT+/NT MAX chart SD card

4 INTERFACE

4.1	Input data sentences	IEC61162-1 and NMEA 0183 Ver2.0 DBT, DPT, MTW, TLL*, VHW, HDT, HDG, DSC*, MWV, DSE*, GGA, GLL, RMA, RMC, VTG, ZDA *: Output with Ver3.0 format.
4.2	Output data sentences	IEC61162-1 or NMEA 0183 Ver2.0 selected on menu $GPAAM, $GPAPB*2, $GPBOD, $GPBWR*2, $GPGLL*2, $GPGTD*1, $GPHDG, $GPGGA, $GPRMA*2, $GPRMB*2, $GPRMC*2, $GPVTG*2, $GPXTE*2, $GPZDA, $GPWPL, $GPMWV, $GPVHW, $GPTLL*4, $GPRTE, $GPMTW, $GPDBT, $GPDPT*3, $GPHSC, $GPWCV*2, $GPAPA*1 *1: Not recommended at Ver2.0 (with Checksum) *2: Output with Ver2.0 format (w/o Mode indicator added Ver3.0) *3: Output with Ver3.0 format (w/o Maximum range scale in use added Ver3.0) *4: Output with Ver3.0

5 SOUNDER

5.1	Transmit Frequency	50 and 200 kHz, dual frequency
5.2	Transmission	600 Wrms or 1 kWrms
5.3	Display range	5/10/20/40/80/150/300/500 m, shift; 0-1200 m 15/30/60/120/200/400/1000/1500 ft, shift; 0-4000 ft
5.4	Extension Mode	Marker zoom, Bottom zoom, Bottom rock, Bottom descrimination
5.5	Auto Mode	Cruising/Fishing selected
5.6	Picture advance	6 steps

6 POWER SUPPLY

6.1	Display Unit	12-24 VDC: 1.5-0.8 A

7 ENVIRONMENTAL CONDITION

7.1	Ambient Temperature	Antenna Unit: -20°C to +70°C Display Unit: -15°C to +55°C
7.2	Relative Humidity	95% or less at 40°C
7.3	Water proofing (IEC60529)	Antenna Unit: IP46 Display Unit: IP45
7.4	Vibration (IEC 60945)	• 2 - 5 Hz and up to 13.2 Hz with an excursion of ±1 mm ±10% (7 m/s^2 maximum acceleration at 13.2 Hz) • 13.2 - 100 Hz with a constant maximum acceleration of 7 m/s^2

8 COATING COLOR

8.1	Antenna Unit	N9.5 (white)
8.2	Display Unit	Cover: 2.5GY5/1.5, Panel: N3.0

INDEX